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DEPARTMENT OF AGRICULTURE
CENTRAL EXPERIMENTAL FARM
OTTAWA, CANADA.

TREES AND SHRUBS

TESTED IN

APR 30 1998

MANITOBA, SASKATCHEWAN AND ALBERTA

BY

WILLIAM SAUNDERS, C.M.G., LL.D.

Director Dominion Experimental Farms

BULLETIN No. 47

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To the Honourable

The Minister of Agriculture.

SIR,—I have the pleasure of submitting for your approval Bulletin No. 47 of the Experimental Farm Series on 'Trees and Shrubs tested in Manitoba, Saskatchewan and Alberta,' which has been prepared by myself.

In this bulletin are given the results of a very large number of trials of trees and shrubs which have been planted at the Experimental Farms at Brandon, Manitoba, and at Indian Head in Saskatchewan, during the past twenty years, to ascertain what species and varieties are hardy enough to endure the winter in those parts of the Dominion. In the gathering of this information I have been ably assisted by Mr. S. A. Bedford, superintendent of the farm at Brandon and by Mr. Angus Mackay, superintendent of the farm at Indian Head, who have carefully planted and cared for the specimens and recorded the results of these tests from year to year. In my annual visits to these farms, during the whole of this period I have also taken careful notes on the growth and relative hardiness of the many species under trial, and a summary of all the experience thus gained will be found in this bulletin.

This experience has also been supplemented by individual trials of many of the shrubs and trees referred to which have been sent to farmers in different parts of the northwestern country for the purpose of testing their hardiness more generally.

The object in view in compiling this information is to present in a convenient and condensed form all the facts ascertained, for the convenience and encouragement of those who desire to adorn their homes with these objects of beauty. The love of trees and shrubs is almost universal and nowhere is it more strongly felt than on the North-west plains where trees and shrubs are scarce. Until within the past few years large sums of money have been spent annually by settlers in the purchase of trees and shrubs from the East, many of which, being too tender to endure the climate, have perished the first winter. The information gained from the tests made at the experimental farms and published annually in the reports has greatly lessened this injudicious expenditure.

While this bulletin has been written mainly for the information of residents in the colder sections of Western Canada, it is hoped that it will also be of value to those living in the East, since any of the species found hardy enough to endure the climates in the North-west may be planted with assurance of success in any of the eastern parts of the Dominion.

I have the honour to be,

Your obedient servant,

WM. SAUNDERS,

Director Experimental Farms.

Ottawa, June 29, 1904.

Second edition November, 1910.

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TREES AND SHRUBS

TESTED IN

MANITOBA, SASKATCHEWAN AND ALBERTA.

More than twenty years of experience have now been had in the testing of trees and shrubs at the Experimental Farms at Brandon, * Man., and at Indian Head in Saskatchewan, also with farmers in many other parts of the Canadian Northwest. During this period a large number of species and varieties have been tried, and while many have proved tender, the number found hardy has been much larger than was at first anticipated. Much interest is felt in tree-planting on the plains, both for ornament and shelter, and improvement made by judicious planting of hardy species about a home is greatly appreciated. Much time and money have been wasted in the past in efforts to grow tender sorts, which do not survive the severe winters. The recommendations made in this bulletin as to hardy trees and shrubs, based on long experience, may be received with confidence. It is hoped that the information given will result in increased planting in cities, towns and rural districts, thus adding to the pleasures and attractions of home life throughout the great North-west country. Trees and shrubs which have been found hardy at the Experimental Farms at Brandon and Indian Head may be safely planted in almost all other parts of the Dominion.

ACER. MAPLE.

The maples form a very interesting and attractive group, consisting of many distinct species, both native and foreign, very few of which will endure the climate of the Canadian North-west. The well-known sugar, red and Norway maples, which succeed so well in the East, have been thoroughly tested both at Brandon and Indian Head by planting many hundreds of each sort in successive seasons, both in sheltered and exposed situations, and after many years of experimenting scarcely a single specimen remains.

Acer saccharinum, L. White or Silver Maple.

This is a native of eastern North America, is of very rapid growth and makes a shapely, rather open, tree. The leaves are silvery white on the under side. The wood is brittle and the branches are very apt to break when laden with ice in winter. This species is found growing farther north than most of the other large-growing maples.

Many hundreds of these trees grown from eastern seed have been planted on the western Experimental Farms during the past 20 years. Only a few have survived.

* Brandon is situated on the main line of the Canadian Pacific Railway, 133 miles west of Winnipeg, and has an altitude of 1,194 feet. Indian Head is in Saskatchewan, 181 miles west of Brandon, also on the main line of the Canadian Pacific, and has an altitude of 1,924 feet.

and most of these are injured more or less every winter. Several specimens have, however, shown greater individual hardiness than others at Brandon, Man., where they have now reached a height of 20 to 25 feet. When seed can be obtained from these trees, young specimens can probably be grown of a hardier type. There are several silver maples growing well at Winnipeg, and at Portage la Prairie there is a group of fine specimens which were planted many years ago a short distance west of the passenger station of the Canadian Pacific Railway. These trees have been watched for the past 12 years, and on no occasion has any winter-killing of the wood been detected. Some seed was obtained one season from these trees, but it did not germinate. Seedlings produced from seed ripened in Manitoba would probably be hardy in the North-west. The seed ripens early and falls from the trees about the middle of June. When gathered it should be allowed to dry for a few days, then sown about an inch deep in drills a foot apart. The seed germinates the same season, and the young seedlings usually attain a height of several inches before winter comes.

A. Negundo, L. Box Elder or Manitoba Maple.

This tree is found in many parts of Canada and the United States. It is a native of Manitoba and of portions of Saskatchewan and Alberta, and, when grown from seed ripened in the North-west, this tree is perfectly hardy and is one of the most valuable and useful trees for that country. It is a rapid grower and succeeds well on all sorts of soil, provided the ground is not wet. Illustrations are given, in plate I., fig. 3, of a single tree grown at the Experimental Farm at Indian Head, of an avenue of the same, plate III., fig. 6, also at Indian Head, and of a hedge of Manitoba Maple, plate V., fig. 1, growing on the Experimental Farm at Brandon. This species is grown readily from seed, which should be sown early in the spring, about an inch deep, in rows about a foot apart. If the ground is kept clean and the surface occasionally stirred with a hoe, the young trees make rapid growth and the strongest of them may be put out in permanent plantations the following season. Large quantities both of the seed and young trees have been distributed annually for many years past from the experimental farms to settlers in the Canadian North-west. Through this work plantations of these trees are now found on homesteads in almost every part of the North-west provinces, which furnish shelter for the growing of garden vegetables, small fruits and flowers, as well as for buildings and stock. Such plantations make the dwellings of the settlers more attractive and home-like and in their shelter many other useful and ornamental shrubs may be successfully grown.

A. spicatum, Lam. Mountain Maple.

This species is found as far north as the Lake of the Woods, and, if obtained from that locality and planted in sheltered spots, should succeed in many parts of the western provinces. Thus far, however, this shrubby species has not been successfully grown either at Brandon or Indian Head. Some 30 or 40 specimens have been planted on each of these farms, and they have usually had their wood killed back more or less every winter.

A. tataricum, L. Tartarian Maple.

This is a native of Eastern Europe. It is a small tree of slow growth that seldom exceeds from 12 to 20 feet in height, which has proved quite hardy. A tree planted at Brandon in 1896 has never been injured by winter, and has borne seed each year since 1898. Seedlings grown from seed ripened on this tree have been planted both at Brandon and Indian Head and are entirely hardy.

A. tataricum Ginnale. Ginnalian Maple.

This is said to be a variety of the Tartarian Maple, and a native of Amurland, which has been extensively grown both at Brandon and Indian Head since 1891, and

found to be thoroughly hardy. It is more shrubby in habit than the Tartarian Maple, seldom attaining a height of over 10 or 12 feet. The leaves are small and prettily cut or lobed. The wings of the seeds are early margined with bright red, and in the autumn the leaves assume brilliant hues of red and scarlet. This is undoubtedly one of the hardiest and most beautiful of shrubs, and it is well adapted for general cultivation throughout the North-west country. It is easily raised from seed, which is produced in abundance on comparatively young specimens.

The following species of maple have been thoroughly tested and found to be too tender to be grown in the Canadian North-west :—

- A. campestre*, L. Common European Maple, Europe.
- A. circinatum*, Pursh. Vine Maple, British Columbia.
- A. glabrum*, T. & G. Smooth Maple, British Columbia.
- A. japonicum*, Th. Japanese Maple, Japan.
- A. monspessulanum*, L. Montpellier Maple, Mediterranean region.
- A. pennsylvanicum*, L. Striped Maple, Eastern Canada.
- A. platanoides*, L. Norway Maple, Europe.
- A. rubrum*, L. Red or Swamp Maple, Eastern Canada.
- A. saccharum*, Marsh. Sugar Maple, Eastern Canada.

ÆSCULUS. HORSE CHESTNUT, BUCKEYE.

The following species belonging to this group have been tried, but they have all proved too tender :—

- Æsculus glabra*, Willd. Ohio Buckeye, United States.
- Æ. Hippocastanum*, L. Horse Chestnut, Europe.
- Æ. Pavia*, L. Red Buckeye, United States.

AILANTHUS. TREE OF HEAVEN.

Ailanthus glandulosa, Desf. Tree of Heaven, China. Tested both at Brandon and Indian Head, but has never survived a winter.

AKEBIA.

Akebia quinata, Decne. China and Japan. This interesting climber has been tried, but is too tender.

ALNUS. ALDER.

Among the alders there are one or two hardy species, but most of them are too tender to succeed in the North-west climate.

Alnus glutinosa. Medic. Common Alder, Europe and North Asia.

Specimens of this tree have done fairly well both at Brandon and Indian Head. Of those planted in 1889, 1890 and 1902 many have proved hardy and have grown well. This tree does not attain a large size. The foliage is glossy and rather handsome. Occasionally the wood will kill back a little in the winter, particularly in newly planted specimens, but usually the tree is quite hardy.

A. crispa (Ait) Pursh. Green Alder. Northern Regions.

This, although a native shrub in the North-west, has not succeeded very well in cultivation. It was first planted at Brandon in 1890, and has generally been hardy

there. At Indian Head the wood has usually been more or less injured in winter, and sometimes it has been killed back as much as one-half.

The species and varieties of Alder which have on trial been found tender are:—

A. cordifolia, Ten. Heart-leaved Alder. South Europe.

A. glutinosa imperialis. Imperial Cut-leaved Alder.

A. incana, (L.) Moench. Speckled or Hoary Alder. Northern Temperate Regions.

A. incana laciniata. Cut-leaved Hoary Alder.

A. maritima, (Marsh) Mühl. Seaside Alder. North America.

AMELANCHIER. JUNE BERRY.

Amelanchier alnifolia, Nutt. Alder-leaved June berry, Saskatoon berry, Northwestern America.

This is a native of Manitoba, Saskatchewan and Alberta. It is a tall shrub, from 6 to 10 feet high, with a rather straggling habit. It produces a fruit much like that of the eastern shad bush, which is much prized both by the Indians and the settlers. The fruit is used in a fresh condition; it is also dried for winter use. This shrub grows fairly well in cultivation.

A. canadensis nana.

A dwarf variety of the eastern Amelanchier or shad bush. This shrub bears a good-sized, edible fruit of fair quality, which has been tested for several years at Brandon and Indian Head, and has been killed back more or less every winter. The ordinary, taller variety, so common in the woods in Eastern Canada, has not been tested sufficiently to permit of an opinion as to its hardiness, but it will probably be equally hardy with the dwarf form.

A. vulgaris, Moench.

The common service-berry of Europe has been tried for several years, but has not made satisfactory progress. It has been killed back more or less each winter.

AMORPHA. FALSE INDIGO.

Amorpha fruticosa, L. False Indigo.

This is a small shrub which bears very dark, bluish-purple flowers in June. It is a native of Manitoba, and if raised from seed ripened in that province will, in all probability, be hardy throughout the western country.

ARISTOLOCHIA. BIRTHWORT.

Aristolochia macrophylla, Lam. Dutchman's Pipe. A native of the United States.

This has been tested at Brandon and Indian Head for the past four years and has been killed back partly or wholly to the ground every winter. Where the roots prove hardy this climbing vine may be useful, as it makes a considerable and rapid growth each year. It has large and handsome foliage and curiously formed flowers which much resemble a small tobacco pipe.

ARTEMISIA. SOUTHERNWOOD.

Artemisia Abrotanum, L. Old Man, Southernwood.

This has been tested since 1890 both at Brandon and Indian Head. The wood has been killed back more or less each winter much as it is in the East, but it always produces a luxuriant growth during the summer.



Lilacs, Seedlings of Charles X, at Brandon, Man.

A. Abortanum tobolskianum. Russian *Artemisia*.

This is a taller and stronger growing variety than the 'Old Man' with a less pleasant odour. It has been tested for the past twelve years; the wood usually kills back in winter from one-third to one-half its length, otherwise it is quite hardy. It makes a strong and rapid growth in the spring. Cuttings of this shrub root readily in any moist soil and grow rapidly. At Indian Head a fairly good hedge has been grown in a single season from cuttings planted in the spring.

BERBERIS. BARBERRY.

The Barberries are a very useful class of shrubs, many of which are hardy or nearly hardy in most of the settled parts of the Canadian North-west. These shrubs bear their small greenish or yellow flowers singly or in bunches, which later in the season are followed by red or purple berries, which hang on the bushes all winter. The fruit may be made into a pleasant acid jelly. Fruits of the common barberry, *B. vulgaris*, are frequently offered for sale for this purpose, especially in the markets of the towns and cities of Quebec.

Berberis amurensis, Rupr. Amur Barberry, from Manchuria.

This variety was first planted in the Canadian North-west in 1898, and thus far has not suffered any material injury from winter. It resembles the common barberry, but seems to be somewhat hardier.

B. Aristata, DC. Large Leafed Barberry, from Napaul and the Himalayas.

This species has been tested for the past ten years, and while in some seasons it is killed more or less at the tips during the winter, it may be regarded as practically hardy. It has large leaves and yellow flowers.

B. canadensis, Mill. American Barberry.

This promises well, but has not been tested long enough to determine its hardiness.

B. Sieboldii, Miq. Siebold's Barberry. China and Japan.

Has been tested both at Brandon and Indian Head for the past five years, and while the tips of the branches have usually been killed back two or three inches each winter, it makes a growth so strong during the summer that the injury is scarcely noticed.

B. sinensis, Desf. Chinese Barberry. China and Japan.

This variety has been under trial in the North-west since 1894. At first it suffered from the killing of the tips in winter, but of late years it has been practically hardy.

B. Thunbergii, DC. Thunberg's Barberry. Japan.

While this species may be regarded as generally hardy, it suffers a little some seasons, usually only at the tips, but occasionally the branches are killed from one-third to one-half their length. When this occurs, if the dead wood is cut out, the rapid growth of the bush soon makes it shapely again. This shrub has been under test at the western farms for eleven years. In this species the leaves are small, nearly round and without teeth on the margins. The flowers are borne singly under the stems, are of a greenish colour and are succeeded by scarlet berries. This shrub seldom exceeds three to four feet in height, and its neat, box-like foliage, which assumes

brilliant red tints in the autumn, followed by the bright scarlet berries which hang on the bush all winter, combine to make it attractive at all seasons of the year.

B. vulgaris, L. Common Barberry. Europe.

This has been under trial at the North-western farms for the past eighteen years. At first, and especially when planted in exposed situations, it was killed back considerably, but in recent years such injuries have been slight, and it may now be regarded as fairly hardy. This species has fruited in the North-west for several years past, and from the seed ripened there, seedlings are now growing which are likely to prove entirely hardy.

B. vulgaris purpurea. Purple-leaved Barberry.

This handsome purple-leaved variety of the common barberry seems to be almost, if not quite, as hardy as the green-leaved form. It assumes its deepest shades of purple in the spring. It is almost hardy, especially when partly sheltered.

The following additional varieties are under trial, but most of them are too tender to be of much value:—

B. Aquifolium, Pursh. Oregon Grape. Kills to ground.

B. Aquifolium Murrayana. Kills to ground.

B. cretica, L. Cretan Barberry. Kills back considerably.

B. ilicifolia, Forst. Holly-leaved Barberry. Kills to near ground.

B. Neuberti. Kills to near ground.

B. virens, Hook. Himalaya. Tender.

BETULA. BIRCH.

The birches are very graceful in their manner of growth, and among them there are several which are very hardy in the North-west.

Betula alba, L. European White Birch. Northern Hemisphere.

This species has been under trial at the Brandon and Indian Head farms for the past 19 years, and its character for hardiness may now be considered as fairly established. Some of the trees early planted are now of good size. In the earlier plantings, which were mostly made without shelter, specimens were sometimes injured by winter, but no injury has been noticed for some years past.

B. alba laciniata pendula. Cut-leaved Birch.

This beautiful cut-leaved form of the European Birch is not so hardy as the common variety. Only a small proportion of the trees planted have survived, but these are now growing and seem to be hardy. This tree has a fine pendulous habit; its long slender branches like delicate streamers reach almost to the ground.

B. lenta, L. Sweet Birch. North America.

This tree has been tested in the North-west for about ten years, and while some of the young trees planted have died, others have survived and are growing nicely, with more or less killing-back from year to year.

B. lutea, Michx. Yellow Birch. North America.

This variety has not succeeded quite so well as the Sweet Birch; a larger proportion of the young trees planted have been killed, and the survivors, although making fair growth, have been more or less injured. This tree somewhat resembles the Sweet Birch both in habit of growth and character of foliage.

B. papyrifera, Marsh. *Alba papyrifera*. Paper or Canoe Birch. Canada, United States.

The Canoe Birch is a native of Manitoba, and has succeeded well in cultivation both at Brandon and Indian Head. A large number of young trees have been collected on the banks of the Souris river, Man., and distributed from the Brandon farm among the farmers of Manitoba for test, with good results.

B. pumila, L. Low or Dwarf Birch. North America.

This species is found native in the Northwestern provinces, and where the soil is fairly moist it succeeds well when transplanted. It makes a pretty, low-growing tree or bush, with its small foliage and twigs dotted with white. It is quite hardy.

Among other varieties of birch which have been tested and found more or less tender are the following:—

B. alba fastigiata. Pyramidal Birch.

B. alba pendula Youngi. Young's Weeping Birch. A single specimen of this tree has proven quite hardy at Indian Head where it has been growing for the past 8 or 10 years.

B. alba pendula elegans. Elegant Weeping Birch.

B. alba purpurea. Purple Birch.

B. dahurica, Pall., from North Asia.

B. nigra, L. River Birch. United States.

B. occidentalis, Hook. Canyon Birch. British Columbia.

B. populifolia, Marsh. American White Birch.

CARAGANA. SIBERIAN PEA TREE.

Of all the shrubs which have been brought from other countries to the Canadian North-west, none have been so uniformly hardy under all circumstances as the species of Caragana, all of which as far as they have been tested have proved perfectly hardy. They are handsome shrubs, with beautiful foliage bearing pretty, yellow, pea-shaped flowers in the spring followed by small, brownish pods which give an abundance of seed. The different species are readily grown from seed which should be sown in the autumn or early in the spring. If well cared for, the young seedlings grow rapidly and produce strong plants the first season, which will be ready to plant in position the year following.

Caragana arborescens, Lam. Siberian Pea Tree. Siberia.

This is a large shrub or small tree, growing when mature from 12 to 15 feet in height. It has been thoroughly tested in many parts of the North-west during the past fifteen years and is reported everywhere as hardy, in exposed as well as in sheltered positions. It has been widely distributed from the experimental farms among thousands of settlers and is proving very useful when planted either as single specimens or as hedges.

C. Chamlagu, Lam. From China and Japan.

This is a smaller-growing species ranging from three to four feet in height. It has been under trial for the past nine years, and has shown no evidence of winter-killing.

C. frutescens, DC. Woody Caragana. Russia to Japan.

A very pretty shrub rarely exceeding three to four feet in height, handsome both in foliage and flower. The leaves are compound in all the Caraganas, in *C. arbore-*
11725—2½

scens they consist of four to six pairs of leaflets, whereas in this species there are only two pairs. This has been tested for the past seventeen years and has proved hardy. *C. frutescens pendula*.—Pendulous Woody Caragana.

This differs from the ordinary form of the Woody Caragana in its more graceful habit and weeping character. It is also quite hardy.

C. frutescens mollis glabra.

Another form of the Woody Caragana which has been found quite hardy at the Northwestern farms.

C. grandiflora, DC. Large-flowered Caragana. Region of the Caspian Sea.

This also is one of the lower-growing species of Caragana, seldom exceeding a height of four or five feet. It is distinguished from the other sorts by its unusually large, bright yellow flowers which give it a handsome appearance in the spring. This also has been under trial for about 17 years, and has never been injured by winter.

C. pygmæa, DC. Dwarf Caragana. Caucasus to Himalaya.

The Dwarf Caragana is a very low-growing form, from 1½ to 3 feet in height, with very small foliage and small flowers. It makes a very pretty bush and is attractive all through the season. It is quite hardy.

CARPINUS. HORNBEAM.

Carpinus caroliniana, Walt. Blue Beech or American Hornbeam. North America.

This has been several times tried at both Brandon and Indian Head, but the trees have been invariably killed back, usually to the ground, every winter, and in the course of three or four years have died.

CARYA. HICKORY.

Carya ovata (Mill) K. Koch. Shagbark Hickory. North America.

This tree has been thoroughly tested at both the North-west farms, and has invariably died the first winter after planting.

CASTANEA. CHESTNUT.

Castanea dentata, (Marsh). Borkh. American Chestnut. North America.

C. sativa, Mill. European Chestnut. South Europe.

Both of these varieties of Chestnuts have been tried and found too tender, none of the young trees having survived the winter.

CATALPA.

Catalpa cordifolia, Jaume. Western Catalpa. Western Kentucky and Tennessee.

C. hybrida, (Teas') Teas' Hybrid Catalpa.

C. Kaempferi, S. & Z. Japanese Catalpa. Japan.

Many young trees of each of these species have been planted at the North-west farms, but in no instance have they survived the winter.

CELASTRUS. BITTERSWEET.

Celastrus articulatus, Thunb. Japanese Bittersweet.

This climber has been under trial during the past ten years, and while most of the specimens planted have been killed back more or less during the winter, they have been found quite hardy near the base, and have made good growth during the summer. It is quite probable that this species may, after a time, become acclimated and useful.

C. scandens, L. Climbing Bittersweet. North America.

This is a handsome climber which is found growing wild in some parts of Manitoba, and is common in the neighbourhood of Birdshill, a few miles east of Winnipeg. It has been found quite hardy at Brandon, and although some specimens have killed back more or less at Indian Head, it may be regarded as practically hardy there also. It is of sturdy habit and bears small, greenish flowers, which are succeeded by clusters of orange-coloured berries.

CELTIS. HACKBERRY.

Celtis occidentalis, L. Hackberry. North America.

Although this tree is found growing wild in some parts of Minnesota, it has not been entirely hardy in the Canadian North-west. At Brandon it has been tested for the past five years, and while some specimens have passed the winters uninjured, others have been killed back, some at the tips only, others as much as one-half their height. At Indian Head the specimens under test have been killed to near the ground. Further trials are being made with specimens grown from seed collected in Minnesota. The foliage of this tree is very susceptible to frost.

CEPHALANTHUS. BUTTON BUSH.

Cephalanthus occidentalis, L. Button Bush. North America.

This interesting shrub, so hardy throughout the eastern part of Ontario, is tender both at Brandon and Indian Head, and is usually killed to the ground each winter.

CERCIDIPHYLLUM.

Cercidiphyllum japonicum, S. & Z. Katsura Tree. Japan.

This is a valuable timber tree in Northern Japan, which has proved hardy in Ottawa. It is, however, tender in the North-west, and has never survived a winter.

CLEMATIS. VIRGIN'S BOWER.

In this group, which consists largely of climbing vines, there are several which are hardy and useful in the Canadian North-west.

Clematis ligusticifolia, Nutt. Western Canada and United States.

This species is found growing wild in river valleys in Alberta, also through the dry districts of central British Columbia. It is a strong growing climber, and is well adapted for the adornment of porches and verandahs. It is quite hardy at Brandon and Indian Head, and has been grown successfully for some years as an ornamental climber at Calgary. The flowers are small and white, and are produced in

abundance, and when in seed the vines are quite ornamental, being covered with masses of silky material consisting of three persistent styles which grow into long feathery arms.

C. recta, L. Erect Clematis.

This may be more correctly classed as a herbaceous perennial than as a shrub. It may, however, be more convenient to treat of it here. This Clematis dies to the ground every year, and sends up strong shoots in spring, which grow to a height of about three feet, when their tips become covered with masses of white, sweet-scented flowers. This has proved hardy both at Brandon and Indian Head, and if protected in winter by a mulch of manure or straw, would probably succeed in any part of the North-west.

C. virginiana, L. Virgin's Bower. Canada, United States.

This native eastern species, which is highly ornamental when in bloom, has been tried with some success at the Northwestern farms. The wood is not entirely hardy, and is usually killed back more or less in winter, but it makes a vigorous growth from near the ground in the spring and blossoms freely during the summer. The flowers are small, white and fragrant, and the masses of silky feathery arms which cover the vine in the autumn give it an attractive appearance at that season also.

C. Vitalba, L. Traveller's Joy. Europe.

The wood of this vine has also been more or less killed by winter in the North-west, but as it sends up in spring strong shoots from near the base which grow very rapidly, the partial winter-killing to which it is subject does not materially lessen its value. In this species the flowers are white with a sweet almond scent, but the vine is about two weeks later in blooming than the Virgin's Bower.

C. Viticella, L. Vine Bower. Europe.

In this species the flowers are larger and drooping and vary in colour from a pale purple to a dull blue, and occasionally are of a dull rose colour. The wood of this vine is also more or less injured by winter, but the base of the plant and the roots are hardy, the growth in summer is rapid and it sometimes blooms freely before the season is far advanced.

C. paniculata, Thunb. Japan.

C. montana, Wall. Mountain Clematis. Himalaya.

Both these species have been tried, but they are too tender to endure the climate.

COLUTEA.

Colutea arborescens, L. Bladder Senna. Mediterranean region.

This shrub, which is rather tender at Ottawa, has been tried in the North-west, but has invariably died the following winter.

CORNUS. Dogwood.

Among the many varieties of Dogwood in cultivation, there are several which succeed well in the North-west.

Cornus alba sibirica. Siberian Dogwood.

This is a rather handsome shrub, with good foliage and numerous clusters of small white flowers during the summer, succeeded by white or lead-coloured berries. The branches and twigs of this shrub, which in summer are greenish or dull reddish, assume a bright red colour during the winter which forms a striking contrast with the pure white snow. This has been tested for the past twelve years at the western farms and found to be hardy.

C. alba sibirica Spæthii. Golden-leaved Dogwood. See Plate III., Fig. 1. This has been tested at Indian Head for a number of years and has proven hardy.

C. alba sibirica variegata. Variegated Siberian Dogwood.

This is a form of the Siberian Dogwood with very pretty variegated leaves, which are blotched and striped with silver. This shrub has not proved entirely hardy; the summer growth has been rather feeble and the wood has usually winter-killed to the extent of one-half and sometimes it has been killed to the ground.

C. Baileyi, C. & E. North America.

In foliage and habit this variety resembles the Siberian Dogwood. It has not, however, shown itself quite so hardy. The wood has usually been winter-killed at the tips, but not to a sufficient extent to interfere with its value as an ornamental object in the shrubbery border.

C. stolonifera, Michx. Red Osier Dogwood. North America.

This shrub is found native in Manitoba, Saskatchewan and Alberta, where it grows freely in ravines and coulées. Its foliage is good and its form attractive. The flowers are white and borne in flat clusters, succeeded by white berries. A very nice hedge may be made of this shrub by growing young plants in the garden from the seeds in the berries and planting them out when two years old in a single row a foot apart. They may also be transplanted from the woods. In this species, the branches also become quite red in the winter, but they do not assume so brilliant a colour as those of the Siberian Dogwood.

The varieties of *Cornus* which have been tried at the North-west farms and found tender are:—

C. alba sibirica elegantissima.

C. Amomum, Mill. Known also as *C. sericea*, L. North America.

C. sanguinea, L. Red-Branched Dogwood. Europe.

The two first named have usually killed outright the first winter, while the latter has generally had its wood killed back one-half, and frequently to near the ground.

CORYLUS. HAZEL NUT.

The two species of wild hazel nut found in Eastern Canada grow plentifully in the Northwestern provinces, and when young bushes are transplanted to the shrubbery or grown from nuts usually make very shapely specimens.

Corylus americana, Walt. Common Hazel Nut. North America.

This is much the commonest species, and is found in abundance in many parts of the North-west. In this species the nut is not entirely covered by the husk, but shows through at the tip.

C. rostrata, Ait. Beaked Hazel Nut. North America.

In this species the husk or covering of the nut is much longer, and not only entirely covers the nut, but extends considerably beyond it, becoming beak-shaped at the tip. Both these species are quite hardy in most parts of the North-west.

COTONEASTER.

The Cotoneasters are handsome shrubs, of which quite a number are being tested. Three of these appear to be quite hardy, both at Brandon and Indian Head.

Cotoneaster acutifolia, Turcz. Sharp-leaved Cotoneaster. Mongolia.

This has been under trial at the North-west farms for eleven years, and only once during this period, in 1900, has it been at all injured by winter, and then it was only killed slightly at the tips. The bush is compact in form and the leaves glossy and pointed. It blooms freely in the spring, but the flowers are small; later in the season the bush is ornamented with black berries.

C. integerrima, Medic. Common Cotoneaster. Mountains of Europe.

This has been under trial for the past twelve years, and has proved entirely hardy. In this species the leaves are more rounded and less glossy; the bush is also more open in habit. The flowers are small, but the berries are red; they are produced in abundance and hang on the bushes all winter.

C. tomentosa, Lindl. Alps.

In this species the leaves are downy on the underside; they are pointed but not glossy. The bush has an upright habit of growth, and the berries are bright red.

These shrubs are not only ornamental when grown singly, they also make very nice hedges. For this purpose the young bushes two years from seed should be planted a foot apart and trimmed once or twice a year to make the growth compact. They are all easily grown from seed, but frequently the seed does not germinate until the second season after sowing.

CRATAEGUS. HAWTHORN.

There are several species of thorn which have proved useful additions to the collections of shrubs at the North-west farms, as they are both attractive and hardy.

Crataegus chlorosarca, Maxim. Manchuria.

This thorn is also known under the name of *C. sanguinea Schroederi*. It bears pinkish-white clusters of blossoms in spring, and is very handsome when in bloom. Its red berries in the autumn are also ornamental. This species has been under trial for the past ten or twelve years, and although it has on one or two occasions been slightly injured in winter at the tips, it may be regarded as practically hardy.

C. coccinea, L. Scarlet Haw. Canada, Eastern States.

This handsome species, so common in fields in the East, is also found native in Manitoba, and its white clusters of bloom in the spring and later its bright scarlet fruit, are frequently seen in the coulees and ravines where native shrubs find shelter. It is found from Winnipeg to near the Rocky Mountains. At both the western farms this has been tested in cultivation and found quite hardy.



1. *Spiraea Van Houttei*. 2. *Lonicera tatarica* alba. 3. *Viburnum dentatum*. 4. *Lonicera*
Alberti. 5. *Eleagnus argentea*. 6. *Syringa vulgaris* Dr. Maillot.
 11725—p. 16.

C. Oxyacantha sibirica. Siberia.

This is a Siberian form of the English hawthorn, which has been under trial for five years. At Indian Head there are specimens from five to six feet high which have made strong growth and been quite hardy. At Brandon the specimens are somewhat smaller, but they have wintered equally well.

C. sanguinea, Pall. Siberia.

This species has also stood the North-west winters well for the past six or eight years. It has grown quite vigorously at Brandon, and some specimens have attained a height of four feet at Indian Head.

There are several other species of thorn under trial, some of which will probably prove hardy. The common English hawthorn, also the double red and double white varieties, have been tried but these are all too tender for the North-west climate.

CYTISUS. BROOM.

In this interesting family of low-growing and free-blooming shrubs there are several species quite useful for cultivation in the North-west. While their wood is not entirely hardy it is usually hardy towards the base and the roots pass the winter uninjured. In the spring rapid growth takes place from those parts of the branches which have escaped injury, the bush soon assumes a shapely form, and is covered with flowers later in the season.

Cytisus capitatus, Scop. Europe.

Quite a number of specimens of this species are now growing both at Brandon and Indian Head. A twelve years' trial has shown that they are usually killed at the tips, and sometimes to the extent of one-half. Occasionally they are killed to the ground, but they make new growth from the base and the bushes are covered with their yellow pea-shaped blooms before the season is over.

C. purpureus, Scop. European Alps.

In this species the flowers are purple and are borne in abundance. Although this is probably not quite so hardy as *C. capitatus*, it makes a very handsome bush when in flower, and although it may be killed to the ground in the spring, it usually flowers well later in the season.

The following species have also been under trial for several years, and although they appear to be somewhat less hardy than those above named they may serve a useful purpose, especially in sheltered spots:—

C. hirsutus, L

C. nigricans longispicatus.

C. sessilifolius, L. These all have yellow flowers.

DEUTZIA.

The Deutzias are very beautiful shrubs, especially when in bloom, but unfortunately none of them are hardy enough to endure the winter in the North-west. The following species have been thoroughly tested and they have all been winter-killed. Most of the Deutzias have been brought from Japan or China.

Deutzia gracilis. S. & Z.

Deutzia gracilis variegata.

Deutzia Fortunei. Carr.

Deutzia hybrida Wellsii.

DIERVILLA. WEIGELIA.

The Weigelias also are mostly Japanese shrubs which have seldom proved entirely hardy at Ottawa. One of the hardiest varieties in the East is *D. florida Sieboldii*, but this on trial has been found too tender for the North-west.

There is a native species of *Diervilla*, which, although much less beautiful than the Weigelias, is well worthy of cultivation.

Diervilla Lonicera, Mill, also known as *D. trifida*.

This species is reported by Macoun to be a common native shrub from the Island of Anticosti in the east to the Red River in the North-west. It is found 'in dry rocky fields, along fences in dry thickets, and also along the gravelly banks of rivers.' The specimens tried in the North-west have been nursery grown and imported from Europe. These have proved hardy in some instances, but in others they have been killed back one-half and sometimes to the ground. They make, however, a vigorous growth from the roots and produce their yellow flowers in terminal clusters later in the season. If this shrub were grown from seed produced in the North-west, it would in all probability be entirely hardy in cultivation.

ELÆAGNUS. OLIVE.

The shrubs or small trees belonging to this genus are very ornamental. The foliage and fruit is of a silvery white—the flowers are small and yellow, fragrant, and produced in great abundance.

Elæagnus angustifolia, L. Russian Olive. Europe.

The ordinary European form of this tree comes from the Mediterranean region and the Orient. Obtained from these sources, this shrub is usually tender in the North-west, but there is a hardy form, apparently of the same species, which has been brought from the northern parts of Russia, and specimens obtained from that source are quite hardy in the Canadian North-west.

Many of the specimens tested at Brandon and Indian Head were grown from seed ripened at the Experiment Station, Brookings, South Dakota. These have made satisfactory growth and are quite hardy. The Russian Olive can also be grown from cuttings, just as currants are grown, from short pieces of the wood of the previous year.

E. argentea, Pursh. Wolf Willow, Silver Berry. North America.

This pretty shrub is found in great abundance in many parts of Manitoba and the North-west. In its wild state it is usually of small growth, has a straggling habit and sends up suckers freely. It frequently grows in large patches, which, when in bloom in the spring, fill the air with their fragrance. In cultivation, it makes a bushy and handsome specimen, (see Plate II, fig. 5), which, with its shining silvery foliage, is a striking object on a lawn. It has, however, the objectionable habit of suckering. For this reason, it is not suitable for a cultivated border, but on a grassy lawn it is very pretty and there the underground roots can seldom force their shoots through the sod. This shrub is entirely hardy in cultivation.

The following species have been tried and found too tender:—

E. macrophylla, Thunb. China and Japan.

E. multiflora, Thunb. China and Japan. This latter species is also known as *Elæagnus edulis*.

EUONYMUS. SPINDLE TREE.

Most of the species forming this group are shrubs which bear small, greenish flowers in the spring, succeeded later by scarlet berries. None of the species yet tested are entirely hardy in the Canadian North-west.

Euonymus atropurpureus, Jacq. Burning Bush.

This species, which is a native in western Ontario, has been tried for the past seven or eight years both at Brandon and Indian Head. In every instance the wood has been killed back more or less in winter, sometimes one-half and occasionally to near the ground. Under such disadvantages this shrub does not make much progress.

E. europæus, L. Common Spindle Tree. Europe.

The European *Euonymus* has also been tried with similar results, the proportion of winter-killing usually ranging from one-half to three-fourths. A Russian form of the European species, which was introduced many years ago by the Late Prof. J. L. Budd, of Iowa, under the name of Russian *Euonymus*, seems to be no hardier in the Canadian North-west than the ordinary form.

E. nanus obovatus.

This is a species from the Northern Caucasus, which has been tried, but found no hardier than the two previously referred to.

E. linearis, fairly hardy; often quite hardy if covered by snow in winter.

EXOCHORDA.

Exochorda grandiflora, Lindl. China.

This shrub, which makes such a handsome and free-flowering specimen in the Niagara district in Ontario, has been tested at Brandon, but has never survived a winter.

FAGUS. BEECH.

Neither the American nor European beech has been found hardy enough to endure the winters in the North-west country. Both have been tried several times during the past twelve years, but in no instance have they survived a winter.

FRAXINUS. ASH.

Fraxinus americana, L. White Ash. North America.

The limits of distribution of this species in Canada is given by Macoun as from Cape Breton, N.S., in the east, to Owen Sound, Ont., in the west. Several hundred specimens of white ash trees of different ages have been tried during the past fourteen years both at Brandon and Indian Head, and a very large proportion of them have gradually died from successive winter-killing. The few survivors appear now to be almost hardy; occasionally specimens will be killed back more or less, while in other seasons they appear to pass the winter uninjured.

F. pennsylvanica, Marsh. Red Ash. North America.

This species is found native in Canada over a very large area, extending from Halifax, Nova Scotia, to the Red Deer River at the head of Lake Winnipegosis, Lat.

53. The red ash has been planted in considerable numbers at both the western farms, the young trees sent there having been grown in the east. A large proportion have lived, and when once well established they appear to be quite hardy. If grown from seed ripened in the North-west they would no doubt be hardy from the beginning. If the branches of this tree are trimmed up so as to expose the bark of the trunk to the action of the sun, it is liable to sunscald, which sometimes seriously interferes with its growth.

F. pennsylvanica lanceolata. Green Ash.

The green ash is also a very widely distributed species. It is common from Ontario to Fort Ellice in Manitoba; it is found also in many parts of Saskatchewan, and is specially abundant in river valleys. It closely resembles the red ash, and both sorts are readily grown from seed. Large quantities of these trees have been grown at the western experimental farms from seed collected in the river valleys. They have been grown to form wind breaks on the experimental farms, and have been distributed in large numbers among farmers. All the trees from this source have been found quite hardy; they are, however, slow growers.

F. nigra, Marsh. Black Ash. Canada, United States.

The black ash is found native in Canada from Anticosti to Fort William on the western side of Lake Superior, also on the Nipigon River and on the east side of Nipigon Lake. Young trees of this species have been repeatedly sent from Ontario to the western experimental farms, but only a small proportion of them have survived. Some which have lived through several winters have gradually reached a fair degree of hardiness. Much better success has been had with young trees brought from Fort William on Lake Superior; such trees have been quite hardy both at Brandon and Indian Head, and are making very fair growth.

The following species of ash have also been tried, but have been found too tender for the North-west climate:—

F. longicuspis, S. & Z. Japan.

F. quadrangulata, Michx. Blue Ash. Western Ontario and United States.

GENISTA. GREENWOOD.

None of the members of this family has been found hardy in the North-west. *Genista tinctoria*, L., Dyers' Green Weed, has been tried several times, but has never survived a winter. In 1900 a Siberian form, *G. tinctoria sibirica*, was obtained and forwarded for test. This variety has thus far proved hardy at the roots, but the young shrubs have been killed to the ground each winter.

GLEDITSCHIA. HONEY LOCUST.

Gleditschia triacanthos, L. Honey Locust. North America.

This tree, which has been much used as a hedge plant in western Ontario, is not hardy enough to endure the climate of the North-west provinces. Sometimes newly-planted specimens in sheltered spots, and small enough to be covered by snow in winter, have survived for a season, but these have usually died the following year.

GYMNOCLADUS.

Gymnocladus dioica (L) Koch. Kentucky Coffee Tree. North America.

Several hundred specimens of this tree have been tried at both the western farms under varying conditions. A very large proportion of them have died the first

winter. A few have survived for a year or two, making a short stunted growth in the summer which would be killed back during the winter.

The following have been tested and found too tender for the North-west climate :—

Hamamelis virginiana, L. Witch Hazel. Eastern North America.

Hypericum calycinum, L. Large calyxed St. John's Wort. Europe.

H. hircinum, L. Goat-scented St. John's Wort. Mediterranean region.

Hæppophæ rhamnoides.

A hardy form of this shrub has been raised in the North-west from seed of this plant grown in northern Russia. These have proven quite hardy, although the plant imported from nurseries in Europe has been more or less tender.

HUMULUS LUPULUS, L. HOP.

The hop is a hardy native, which makes a good climber to form shelter on a trellis, or covering for the lattice work of a verandah. It has been tried both at Brandon and Indian Head and found hardy. The European sorts of hops have also proved hardy at these farms.

HYDRANGEA.

Hydrangea paniculata grandiflora. Japanese Hydrangea.

The Japanese Hydrangea has been repeatedly tried at both the western farms, and although it sometimes survives the winter, it is frequently killed back, and sometimes to the ground. It is a very free-blooming shrub, and when it does survive it always makes an effort to flower, but any flowers yet seen in the North-west on this shrub have been small and puny when compared with the large clusters of bloom grown in the east. This shrub succeeds best in a moist climate, and the North-west air is dry; under such circumstances, vigorous growth can scarcely be expected. By providing careful shelter for the winter and giving a good deal of attention in the way of watering during the summer, the Japanese Hydrangea may very probably be induced to grow and bloom, but, without care, success is very doubtful.

JUGLANS.

Juglans cinerea, L. Butternut. North America.

Juglans nigra, L. Black Walnut. North America.

The Butternut and Black Walnut have both been thoroughly tested at Brandon and Indian Head, and many hundreds of young trees having been planted under varied conditions as to shelter. As a rule, they have all perished the first winter. Under exceptional conditions as to shelter, an occasional specimen will sometimes survive for one or two seasons, but in all such cases the growth is very stunted and the new wood is usually killed back every winter to near the ground.

LIGUSTRUM. PRIVET.

As a class the privets are too tender to succeed in the North-west; there is one variety, however, which is hardier than the others, with which partial success has been obtained. This is known as the Amur Privet, *Ligustrum amurense*, Carr., which comes from the Amur region. Some seasons this seems to be hardy, while at other

times the tips of the bushes will be killed and occasionally the winter-killing will extend half way or more to the ground. At Brandon it has been tried as a hedge, and while some specimens have had their wood more or less killed, others alongside have been uninjured.

The more tender sorts which have been tried are the following, and none of them has survived:—

Ligustrum sinense, Lour. Chinese Privet. China.

L. vulgare, L. Common Privet. Europe.

L. vulgare fol. aureis var. Golden Privet.

LONICERA. HONEYSUCKLE.

The Honeysuckle group includes some climbers, with a large number of bush varieites, and most of the bush forms are very hardy and well adapted for cultivation in the North-west country. They flower very freely in the early spring, and the flowers vary in tint from pure white through different shades of rose to red. They also vary much in size and are succeeded by berries, most of which are red.

Lonicera spinosa, Jacq., var. *Albertii*. Albert Regel's Honeysuckle. Eastern Turkestan and Siberia.

This is a low-growing bush with narrow leaves and fragrant flowers of a dull rose colour. It has been tested at Indian Head for twelve years and has shown itself always very hardy. It is a most desirable shrub, (see Plate II., fig. 4), which blooms during the latter part of June.

L. bella atrosea. A medium-sized bush, very free flowering, flowers rosy, Hardy.

L. flava, Sims. Another of the bush forms of medium size with yellow flowers.

L. gracilipes, Miq. Japan. A shrubby form of small size, with pink flowers and small leaves. Hardy.

L. dioica, L. A glaucous-leaved climbing honeysuckle found in the United States and Canada, a climber with yellow flowers. This species is quite ornamental and very hardy.

L. hirsuta, Eaton. Hairy Honeysuckle. A bushy shrub with orange yellow flowers found in Canada and the United States. Hardy.

L. Maackii, Herd. Maack's Bush Honeysuckle is a pretty species and a very hardy form. This is a native of Manchuria, is a very free bloomer and the flowers are white.

L. Morrowi, A. Gray. Japan. A shrubby species which bears white, or yellowish white flowers in great profusion. Hardy.

L. oblongifolia, (Goldie.) Hook. North America. A native species found in different parts of Manitoba. Hardy.

L. sibirica, Vest. Another hardy bush form; a free bloomer and desirable.

L. Ruprechtiana, Regel. A bush honeysuckle from Manchuria, with white or yellowish white flowers.

L. tatarica, L. Tartarian Honeysuckle.

L. tatarica alba. (See Plate II, fig. 2.)

L. tatarica elegans.

L. tatarica grandiflora.

L. tatarica splendens.

These are all large-growing shrubby forms of honeysuckle, originally from Siberia, which are very ornamental. They flower profusely in the early spring and the flowers

vary in size in the different forms; they also vary in colour from white through shades of rose to red, and are very hardy.

L. Xylosteum, L. Upright Fly Honeysuckle is a hardy European sort, with small creamy-white flowers.

Among the varieties of honeysuckle which have been tested and found tender in the North-west are *L. Periclymenum*, L., the fragrant English Honeysuckle, and *L. sempervirens*, L., the Scarlet Trumpet Honeysuckle, both very desirable climbers. These have been tried several times at both the North-west farms, but have not survived.

LYCIUM. MATRIMONY VINE.

Lycium chinense, Mill. Chinese Matrimony Vine, China.

This is a robust growing, woody vine which sends up new shoots from the base every year which grow to a height of six or eight feet, and bear, along the greater part of their length, purple flowers followed by brilliant red berries which adorn the vines until winter. Although they are liable to kill to near the ground in winter in the North-west, they send up vigorous shoots in the spring which flower and fruit well during the summer.

L. europæum, L. Matrimony Vine. Mediterranean region.

The European Matrimony Vine resembles the Chinese much in its habit of growth, its flowers are violet coloured, and the fruit, which is smaller than that of the Chinese species, is bright scarlet. Well established plants in good soil will often make shoots 8 or 10 feet long in a single season. If grown in the shrubbery border or singly on the lawn they should be tied to a central stake, and the branches allowed to droop from this to the ground. This also is quite hardy in the North-west Provinces.

MENISPERMUM. MOONSEED.

Menispermum canadense, L. Canadian Moonseed. North America.

The Canadian Moonseed is a woody climber which in the North-west is usually killed to ground in winter, but sends up shoots from the base in the spring which grow rapidly and attain a considerable height before the season closes. The roots are thick and woody, the flowers small, greenish-yellow.

M. dauricum, DC. Siberia and China.

This is another member of the same family; it closely resembles the Canadian species, but is perhaps somewhat hardier.

MORUS. MULBERRY.

The only species of mulberry likely to succeed in the Canadian North-west is the Russian Mulberry *Morus hybridum*. This has been thoroughly tested both at Brandon and Indian Head, and has failed owing to lack of hardiness.

OSTRYA. HOP HORNBEAM, IRONWOOD.

Ostrya virginiana, (Mill.) K. Koch. Ironwood. North America.

The Ironwood is found in many parts of Eastern Canada and the United States, extending as far west as Minnesota. Many specimens grown in the east have been

planted both at Brandon and Indian Head, and they have usually been killed back more or less every winter, sometimes at the tips only, at other times half way or to near the base, and occasionally they have been injured so much as to cause their death. Some young trees grown from seed ripened in Minnesota have proved considerably hardier and have come through the past three or four winters almost uninjured. Young trees grown from eastern seed are too tender for the North-west climate, but if grown from seed ripened in Minnesota it is probable that they will, as a rule, prove fairly hardy in sheltered situations.

PERIPLOCA.

Periploca græca, L. The Periploca. South-eastern Europe.

This is a deciduous, twining, woody vine found in many parts of Europe. It has been tested in the North-west for the past five years, and although it is killed to the ground each winter, it usually makes a fair growth of young shoots during the summer. The foliage of this vine is handsome, the leaves being ovate in form and from three to four inches in length.

PHILADELPHUS. MOCK ORANGE.

These shrubs are also known under the name of Sweet Syringa, although the term Syringa properly belongs to the Lilac. There are many different sorts of Mock Orange or Philadelphus, all of which produce, in spring, white flowers in great abundance. Some of these have a strong perfume resembling that of the orange blossom, while others are almost odourless. When in bloom these shrubs are quite an ornament in the shrubbery border. In the North-west they are all too tender to be grown with success, unless the branches are bent down and well covered with soil during winter; without such protection they very seldom produce any flowers. Some seasons the wood is killed to the extent of one-third to one-half; at other times it is killed to the ground. The roots, however, are hardy, and strong shoots are sent up in the spring which make good growth during the summer.

During the winter of 1901-2, two of the varieties under test, which are probably a little hardier than the other forms, passed through the winter at Brandon with less than the usual amount of injury and *P. deutziaeflorus* and *P. grandiflorus* each produced, for the first time, a few flowers. By giving these shrubs the protection referred to by covering them with soil or by wrapping with straw or covering with a box, they may be so far preserved as to admit of their flowering to some extent. Most of the varieties have been under test for from six to sixteen years.

The following are the sorts which have been under trial:—

Philadelphus cordifolius, Lange. Heart-leaved Philadelphus.

P. coronarius, L. Mock Orange. Asia.

P. coronarius foliis aureis. Golden-leaved Mock Orange.

P. coronarius nana. Dwarf Mock Orange.

P. deutziaefloms. Deutzia-flowered Philadelphus.

P. Gordonianus, Lindl. British Columbia. Western United States.

P. grandiflorus, Willd. Large-flowered Philadelphus. Southern United States.

P. hirsutus, Nutt. Oregon.

P. hybridus Lemoinei. Boule d'Argent.

P. inodorus speciosus grandiflorus.

P. Ketelerii, fl. pl. Double-flowered Philadelphus.

P. Satsumi, Siebold. Japan.



1. Golden Leaved Dogwood. 2. White Spruce Hedge, Brandon. 3. Superintendent's House and Barn, Brandon. 4. *Salix brutchensis* Hedge, Brandon. 5. Avenue, Dakota Cottonwood, Indian Head. 6. Avenue, Manitoba Maple, Indian Head.
1725 -p. 24.



1. Row of Poplars in Arboretum, Indian Head. 2. Balm of Gilead (*Pop. balsamifera*) Indian Head. 3. Manitoba Maple (*Acer negundo*) Indian Head. 4. American Elm (*Ulmus Americana*) Indian Head.

PHYSOCARPUS. NINEBARK.

Physocarpus opulifolius, (L) Maxim. Ninebark. North America.

This was formerly grouped with the Spiræas and known as *Spiræa opulifolia*. It is native in the western part of Ontario, and in the North-west is usually found to be quite hardy. It forms a very shapely shrub which produces in the spring clusters of small white flowers, succeeded by purplish seed pods. In fourteen years' trial at Brandon it has only once suffered from winter, that was in 1900, when the wood was killed back from one-quarter to one-half its length. At Indian Head it has been tested for the same period and has also been quite hardy except in 1900, when it was killed back about one-half.

P. opulifolius aureus. Golden-leaved Ninebark.

This is a golden-leaved variety, which is very handsome and attractive, especially in the spring, when its golden hue is brightest; later in the season the golden tint fades more or less, becoming yellowish green. This seems to be quite as hardy as the ordinary green form. Both sorts have been tried for many years and have never been injured by winter except in 1900.

PLATANUS.

Platanus occidentalis, L. American Plane Tree, Buttonwood.

This beautiful tree, which succeeds so well in Eastern Ontario, will not endure the climate of the North-west. Some hundreds of specimens have been planted at the two western farms, under different conditions as to shelter, but none of them has ever survived the winter.

POPULUS. POPLAR.

The poplars are a most useful family of trees in the North-west, for the reason that so many of them are perfectly hardy; they also grow very rapidly and soon make desirable shelter. In Plate IV., Fig. 1, a group of poplars is shown in the Arboretum at Indian Head. They are also easily propagated from cuttings. These may be made from the growth of the preceding year from 10 to 12 inches in length, cut off to near a bud at each end and buried in the soil so that the upper bud just shows above the surface. Such cuttings generally produce young trees from three to four feet high before the end of the season.

Populus balsamifera, L. Balsam Poplar.

This is a very hardy native tree which attains a large size as far north as the Mackenzie River and endures the climate well in all parts of the North-west. The leaves are rather large, ovate and pointed, deep green on the upper surface and whitish below. The buds of this tree are covered with a sticky gum which has a pleasant balsamic fragrance. From its sturdy growth this tree does good service in the shelter belt planted with other sorts.

P. balsamifera suaveolens.

A variety of the balsam poplar, said to be more fragrant than the common form. This tree has been tried both at Brandon and Indian Head, and found hardy.

P. berolinensis, Dippel.

This is one of the best of the Russian Poplars. It was first planted at the experimental farm at Brandon in 1889 and at Indian Head in 1890, and has shown con-

tinued hardiness ever since. It is a vigorous and upright grower, with rather large foliage and is proving a valuable tree for the North-west country.

P. Certinensis, Hort.

Like *P. berolinensis* this is a Russian variety which is very hardy. It has been under continuous trial for 14 or 15 years, and has never shown any injury from winter.

P. deltoides, Marsh. Cottonwood. North America.

The Cottonwood is one of the most vigorous and rapid growers of all the poplars, and has probably been more largely planted on the prairies than any other species. This is found native in the North-west, and is quite hardy in most of the settled parts of the North-west provinces. During recent years a yellow rust or fungus has occurred, in many places, on the under side of the leaves, seriously injuring the trees and sometimes causing their death. An avenue of these trees grown at Indian Head is shown in Plate III., fig 5.

P. deltoides aurea. Golden-leaved Poplar.

This is a very attractive variety with golden tinted foliage. It has been tested for 10 or 12 years and has only been injured by winter once, which was in 1900. At that time several were killed back one half at Brandon and others were killed outright at Indian Head.

P. laurifolia, Ledeb. Siberia.

In this species the leaves resemble those of the laurel in form, being oval, oblong and pointed. It is very hardy, having stood the winters at Brandon uninjured for the past six or seven years.

P. nigra, L. Black Poplar. Europe.

The European black poplar has been tested both at Brandon and Indian Head for the past five years, and has not during that time shown any injury from winter. This is also a rapid grower. The leaves are of a light green colour, slightly notched at their edges, and the branches greenish-white.

P. nigra Nolestii.

A vigorous growing form of the black poplar, which has also proved quite hardy in the North-west.

P. Petrowskiana, Sch.

This variety has been under trial for 14 or 15 years at the western Experimental Farms, and has proved hardy throughout.

P. tremuloides, Michx. American Aspen. North America. So named from the tremulous motion given to the leaves by the slightest breeze.

This is one of the most widely distributed of trees, being found from Labrador in the east to the Great Mackenzie Basin in the far North-west; it is also found in Alaska. The leaves are rounded, heart-shaped, terminating in a short, sharp point. The tree grows from 20 to 50 feet high, and is very hardy. Good shelter belts have been formed at Indian Head by planting young trees of this species five feet apart each way.

P. Wobskii, Schroeder.

This is another of the European varieties of garden origin, which has proved useful in the North-west country. It is a rapid grower and makes a handsome tree.

Among the varieties of Poplar which have proved more or less tender in the North-west are the following :—

Populus alba, L. White or Silver Poplar. Europe.

P. alba pyramidalis. Pyramidal Silver Poplar—*P. bolleana*.

P. grandidentata, Michx. North America.

P. nigra pyramidalis. Lombardy Poplar. Europe.

P. nigra betulæfolia. Birch-leaved Poplar.

POTENTILLA.

Potentilla fruticosa, L. Shrubby Cinque-foil.

This is rather an attractive shrub with pinnately cut leaves and yellow flowers. It is found in the northern parts both of Europe and America, and is native in the North-west provinces. For the past eight or nine years it has been tried in cultivation at both the Experimental Farms at Brandon and Indian Head and found entirely hardy.

PRUNUS. PLUM, CHERRY.

In the genus *Prunus* are included the wild and cultivated forms of Plum and Cherry.

Prunus americana, Marsh. Wild Yellow or Red Plum. North America.

This species is found native throughout the greater part of the United States ; also in southern Ontario in Canada. The flowers are white and are produced in great abundance before the leaves are fully expanded. The fruit is yellow or red, and varies much in different trees both in form and quality. The flavour of the fruit is usually pleasant, but the skin is tough and astringent. The tree has a spreading habit and bears large crops. The improved forms of this fruit, of which there are now many, are very desirable, and they are largely grown in districts in eastern and northern Ontario and in parts of Quebec where the better European sorts are too tender to succeed.

Some of these are hardy in the Canadian North-west, but the fruit is so late in ripening that it is generally cut by frost before it is fully matured. In specially favourable seasons these plums ripen fairly well, when they are very much appreciated.

P. nigra, Ait. Canada Plum. Canada, United States.

The Canada Plum is found wild throughout the greater part of Canada, also in the United States. It may be said to be the plum of the north and north-west. It is found wild in Manitoba, and is abundant in the river valleys in the southern parts of that province. It blossoms about a week earlier than *P. americana*; the fruit also ripens earlier. The fruit varies much in quality, form and colour, and in cultivation it has been found quite hardy all through the North-west country. The tree is more compact and upright in habit than *P. americana*, and on account of the earlier ripening of its fruit, the Canada Plum is much more useful. New varieties are frequently produced by selection and cross-fertilizing, and some of these ripen early enough in the North-west to mature their fruit every season before frost comes. A large number of seedlings have been grown at Brandon and Indian Head from some of the best

and earliest ripening sorts, and have been distributed among settlers in many parts of the west for trial.

P. pennsylvanica, L. Pin Cherry. North America.

This species is found throughout the greater part of Canada from Nova Scotia to the Rocky Mountains. In the East it becomes a tree of from 20 to 30 feet high, whereas in the North-west it is reduced to the size of a large bush. The flowers are small, white, with many in a cluster; the fruit is very small, light red in colour, with a very thin layer of sour, astringent flesh covering a relatively large stone. In the west much of this fruit is gathered and used for making jellies and for other household purposes. This tree is quite hardy under cultivation.

P. pumila, L. Sand Cherry. North America.

The sand cherry is a native shrub which is widely distributed. Macoun says 'it is found on sand beaches and plains on the Gaspé coast, and westward along the St. Lawrence and Great Lakes, and on the prairies to about the 106th meridian. In many parts of Manitoba it is quite common. It is a low-growing shrub, with a pendulous habit, having white flowers and narrow willow-like leaves. The fruit which is usually produced in abundance, varies much in size and quality. Sometimes the pulp is very thin and there is little more than a covering of skin over the stone, and the fruit is very astringent. Occasionally, examples are found where the fruit is much larger, with a good proportion of pulp, juicy and of fair flavour. It may be grown from seed, layers, or cuttings. Young trees grown from seed ripened in the East, while hardy in their wood when planted in the North-west, often have the flower buds killed in winter and bear no fruit. Those grown from seed ripened in the North-west, produce blossom buds which are seldom injured. The sand cherry is quite hardy in the North-west.

P. demissa, Walp. Western Wild Cherry.

In blossom and in fruit this much resembles the wild black cherry of the east, *P. serotina*, but the western wild cherry as seen in the North-west provinces seldom grows to a height of more than 10 or 12 feet. It is very common, especially in the northern parts of Manitoba. The flowers are white and are borne in racemes, and the fruits are purplish-black and astringent. This tree is very ornamental, especially when in bloom and succeeds well in cultivation. It has proved quite hardy both at Brandon and Indian Head.

P. Grayana, Maxim. Japan.

This species has not been tested very long; thus far it has been found hardy at Indian Head.

Prunus Maackii, Rupr. Manchuria.

This is a very vigorous growing shrub or small tree which attains a height of eight to ten feet. It has been under test since 1894, and has been found hardy both at Brandon and Indian Head.

Among the other species which have been tested the following have proved more or less tender:—

P. maritima, Wang. Beach Plum. Eastern United States. Some seasons this has made fair growth and passed the winter without much injury; at other times it has been killed to the ground.

P. Mahaleb, L. Europe. Kills nearly to the ground in winter.

P. Maximowiczii, Rupr. Manchuria. This species has not been very long tested. Some seasons it has seemed fairly hardy, in others it has been killed back about one-half.

P. tomentosa, Thunb. Japan. This is usually killed during the winter to near the ground, but sometimes it escapes with less injury, the winter-killing extending only half way to the base.

P. serotina, Ehrh. Wild Black Cherry. Canada, United States. This eastern form has been extensively tested both at Brandon and Indian Head. It is usually killed nearly to the ground in winter.

PTELEA. WAFER ASH.

Ptelea trifoliata, L. Wafer Ash. Southern Ontario, United States.

The Wafer Ash is a large shrub with numerous stems proceeding from the root-stock. The flowers are small and whitish, the seed capsules have flattened wings, somewhat resembling those of the elm, but much larger. The shrub occasionally survives the winter without injury, but more commonly is killed back from one-third to one-half its length, and sometimes it is killed entirely.

P. trifoliata aurea. Golden Wafer Ash.

This differs from the type only in the golden yellow colour of its foliage.

PYRUS. PEAR, APPLE, MOUNTAIN ASH, &c.

Included in the genus *Pyrus* there are several trees and shrubs valuable in the North-west.

Pyrus baccata, L. Siberian or Berried Crab.

This species is widely distributed throughout Siberia and is found also in Japan and the Himalayas. In 1889 seed of this tree was obtained from the Imperial Botanic Gardens at St. Petersburg, Russia. Young trees raised from this seed were sent to the western Experimental Farms in 1893, and they have been grown there in increasing numbers ever since and have proved entirely hardy. *Pyrus baccata* is a handsome ornamental tree in the spring when covered with its white blossoms; also in the autumn when thickly hung with red or yellow fruit. The fruit varies in size from about one-eighth to three-fourths of an inch in diameter; in colour, through different shades of red to yellow, and in quality, it is sometimes fairly edible and sometimes unpleasantly astringent. The fruit of all these different forms makes good jelly and on this account is useful to the North-west settlers.

These native forms are quite distinct from the new and improved types of cross-bred apples, which have been originated at the Experimental Farms by crossing *P. baccata* with different sorts of cultivated apples. These are hardy in the North-west and large enough to be of value for general domestic purposes.

There are quite a number of different forms of *P. baccata* in cultivation, but the differences in them are slight, and as they do not reproduce themselves truly from seed, they may be all classed together. The varieties referred to are:—

P. baccata aurantiaca.

P. baccata cerasiformis.

P. baccata edulis.

P. baccata flava.

P. baccata macrocarpa.

P. baccata microcarpa.

P. baccata sanguinea.

All these have been tried in the North-west and have proved entirely hardy.

P. prunifolia, Willd.

This is also from Siberia. The flowers and fruit are both larger than *P. baccata*, the fruit varying from half an inch to nearly an inch in diameter. The variations in colour and quality are similar to those in *P. baccata*. This species has been cultivated for more than a century, and is said to be the original of the garden crabs. In this species the calyx, or eye, of the fruit is usually persistent, whereas in *P. baccata* the calyx is usually deciduous, and drops from the fruit before fully matured.

P. prunifolia has been tested thoroughly at Brandon and Indian Head, and seems to be equally hardy with *baccata*.

This species has also several horticultural forms, of which the following have been tried and found hardy, but the differences are so small that, like those of *baccata*, they may be classed together.

P. prunifolia conocarpa.

P. prunifolia intermedia.

P. prunifolia oviformis.

P. prunifolia xanthocarpa.

P. americana (Marsh). DC. American Mountain Ash.

This species much resembles the European Mountain Ash, but the tree is of much smaller growth. The berries also are brighter in colour and the clusters are larger, while the individual berries are smaller; the leaves also are larger and bright green, shining above. The leaflets are lanceolate and taper-pointed in the American Mountain Ash, while they are oblong and obtuse in the European species.

The American Mountain Ash is a native of Canada, and is widely distributed, being found from Cape Breton, N.S., to Lake Winnipegosis, in Manitoba. It is also very common about the Lake of the Woods. Specimens obtained from the neighbourhood of Whitemouth, Man., and planted at Brandon and Indian Head have proved hardy, but specimens grown from eastern seed have been more or less tender.

P. Aucuparia, (L.) Ehrh. European Mountain Ash.

This well-known tree forms an erect rounded head, and in favourable locations attains a height of 25 to 30 feet. It has not been successfully grown in the North-west. Occasionally a tree in exceptional shelter or at a low altitude will do fairly well and survive for a time, but it cannot be depended on. At the western Experimental Farms this tree has been thoroughly tested and has usually been killed back more or less each winter, and sometimes killed to near the ground.

The following additional varieties of *Pyrus* have been tested in the North-west and found too tender for the climate:—

P. alnifolia, K. Koch. Japan.

P. betulæfolia, Bunge. Birch-leaved *Pyrus*. China and Japan.

P. coronaria, L. American Crab Apple. Western Ontario.

P. Maulei, Mast. Maule's Japanese Quince.

P. rotundifolia, Bechst. Europe.

P. rivularis, Dougl. North America.

P. sinensis, Lindl. Chinese Sand Pear. China.

QUERCUS. OAK.*Quercus macrocarpa*, Michx. Mossy-cup Oak.

The only Oak native in the North-west is the Mossy-cup Oak. This is a very slow-growing tree, which is widely distributed, being found from New Brunswick to Manitoba. In the east it attains a good size and makes fair growth. Along streams

and in sheltered localities in the North-west, also on the shores of Lake Winnipeg, some large specimens are found, but in exposed situations farther west and north it reaches but a small size, and is known as 'scrub oak.' On the Experimental Farm at Brandon some very good examples of this stunted growth are found, and from acorns produced there a large number of seedlings have been raised, which have been planted at Indian Head and distributed among settlers in the North-west provinces. These have proved entirely hardy. Its very slow growth interferes with the more general planting of this tree.

The only other Oak which has shown encouraging hardiness is an undetermined species grown from acorns received from Japan. Young trees of this variety have been under trial for several years, both at Brandon and Indian Head, and appear to stand the winter well.

The other oaks which have been tested and found too tender for the climate are:

Q. Cerris, L. Turkey Oak. South and East Europe.

Q. coccinea, Moench. Scarlet Oak. North America.

Q. pedunculata fastigiata. Pyramidal Oak.

RHAMNUS. BUCKTHORN.

The Buckthorns are shrubs of which a large proportion have proved hardy in the North-west. Grown as single specimens on the lawn, they are very shapely, and although the flowers are small and inconspicuous, when in fruit these shrubs are quite attractive. They are also useful for hedge purposes and are easily grown from seed.

Rhamnus alnifolia, L'Herit. Alder-leaved Buckthorn. Canada, United States.

This is a low-growing shrub from 2 to 4 feet high, which is a native of the North-west. It is quite hardy in cultivation. It has small, greenish, inconspicuous flowers, and oval, acute serrate leaves from 1½ to 4 inches long. The fruit is black.

R. cathartica, L. Common Buckthorn. Europe.

This shrub has been under trial for the past six years, both at Brandon and Indian Head, and has proved hardy. The flowers are small and green, the fruit black and about ¼ inch in diameter. Leaves ovate in form, sharply toothed, from 1 to 2 inches long and sub-opposite. This species is usually thorny.

R. dahurica, Pall. Siberia to China.

This species of Buckthorn usually grows from 5 to 6 or 8 feet in height; is a large, spreading shrub with stout, thorny branches. The flowers are greenish-yellow and the berries black. The leaves vary in form from obovate to narrow lanceolate, and are from 1 to 2½ inches long. Hardy.

R. Frangula, L. Alder Buckthorn. Europe.

This is a strong-growing, shapely shrub, which when mature reaches a height of 5 to 8 feet. The flowers are small and whitish, the fruit dark purple, about ¼ inch in diameter, and the leaves are obovate, entire and alternate. This also is hardy.

R. infectoria, L. South Europe.

This a low-growing shrub, about two feet high, which has been tested at the western farms since 1897. The first year it was slightly injured by winter, but since then it has passed the winters uninjured. The flowers are greenish-yellow and the berries black; the leaves are ovate, lanceolate, and the shoots are armed with spines, both terminal and lateral.

R. crenata, S. & Z., a Japanese species, has also been tested, but this has been found too tender for the North-west climate.

R. Purshiana, DC. British Columbia. Is also tender.

RHUS. SUMACH.

In this family many of the species are killed to near the ground in winter, but send up shoots from the base in the spring, which make good-sized specimens by the autumn, when the foliage assumes brilliant shades of red and scarlet, which make the bushes very attractive.

R. canadensis, Marsh. (*R. aromatica*, Ait). Fragrant Sumach. Eastern Canada.

This is a spreading shrub from four to six feet high, with small, yellow flowers in clusters and aromatic leaves. It has been under test at Brandon since 1897. Some seasons it has wintered well, in others it has killed back more or less, usually about one-quarter, and in the severe winter of 1900 it was killed to the ground.

R. aromatica trilobata has only been recently tested, but as this species grows freely on the banks of the Saskatchewan, near Medicine Hat, also on the bluffs which margin the Belly River at Lethbridge, it is no doubt perfectly hardy. This is a very dwarf species with small foliage, which assumes brilliant tints in the autumn; height one to two feet.

R. glabra, L. Smooth Sumach.

This species is widely distributed in Canada from Nova Scotia in the east to the Saskatchewan River in the west. Specimens found in Manitoba and transplanted to the experimental farm at Brandon have been quite hardy. Eastern specimens sent to Indian Head have usually been more or less winter-killed. In the North-west it grows from five to eight feet high, with large compound leaves and terminal panicles of crimson fruit.

R. Cotinus, L. The Smoke or Mist Tree, also the variety known as *atropurpurea* have both been tested and found too tender.

RIBES. CURRANT, GOOSEBERRY.

Only the wild forms will be referred to here.

R. alpinum, L. Mountain Currant.

This is found in the mountains of Europe. In cultivation it makes a compact and shapely bush, well clothed with foliage. The flowers are yellowish-green and the fruit scarlet, insipid or sweetish. This has been tested at Brandon for the past ten years and found quite hardy; at Indian Head it has usually been killed at the tips and sometimes one-third to one-half. A dwarf form known as *R. alpinum pumilum* has been hardy at both farms, possibly because the dwarf form is better covered by snow during the period of low temperatures in winter.

R. floridum, L'Her. Wild Black Currant.

This is found quite common throughout the North-west provinces, and succeeds well in cultivation. The fruit resembles that of the cultivated black currant, *R. nigrum*, in flavour, but is stronger and less agreeable. The fruit also ripens more slowly and irregularly, which is a disadvantage when picking the fruit.

R. aureum, Pursh. Missouri Currant. Mississippi Valley to Rocky Mountains.

This is a yellow-flowered currant which, when in bloom in the spring, is very showy and attractive. The flowers are fragrant and the fruit is dark brown to black. This has been tested for the past six years, both at Brandon and Indian Head, and



1. Manitoba Maple Hedge, Brandon, Man. 2. Flower Garden in front of Superintendent's House, Indian Head, Sask. Low hedges made of Native Shrub known as Snowberry.
11725—p. 32.

found quite hardy. A garden variety with cut leaves known as *R. aureum tenuifolium*, has also been tested and found to be tender, having been killed each winter from one-half to near the base.

The following have also been tested and found too tender:—

R. Gordonianum, Lem. A hybrid between *sanguineum* and *aureum*.

R. sanguineum, Pursh. From British Columbia; a very ornamental species with bright red flowers.

ROBINIA. LOCUST.

The Locust Tree, *Robinia Pseudacacia*, L., so commonly grown in the east, has been tested in the North-west by the planting of several hundred young trees on both of the Western Experimental Farms for two or three years in succession, and they have in each instance all died the following winter.

ROSA. ROSE.

The Rose is probably the most popular flower grown, and it is in the double-flowered garden form that it is most highly appreciated, where it combines a loveliness of form with a delightful fragrance. The wild roses as a rule are also sweet scented, and they have a simple charm and a beauty of their own which deserves attention. Their more frequent use in the shrubbery border and in clumps on the lawn is most desirable. Many varieties of roses have been tested in the west, both single and double, but comparatively few of them have been found hardy enough to endure the climate.

Rosa blanda, Ait. North America.

This produces a single rose about one and a-half inches across, the flowers are usually pink, but sometimes white. Height, 2 to 4 feet. Hardy.

R. ferruginea, Vill. Purple-leaved Rose. Mountains of Europe.

This is an upright shrub from 4 to 6 feet high, with purplish branches and foliage of a dull purplish shade, more or less tinged with red. The flowers are small and of a deep red colour. This bush is effective in a group from its distinct purplish foliage. Hardy.

R. rubiginosa, L. Sweet Briar. Europe.

This well known garden favourite has been tested both at Brandon and Indian Head, but it has not proved generally hardy. It has usually been more or less injured by winter every season. One specimen planted at Indian Head passed through two or three winters without injury, but was killed back one-half in 1900, and has been killed back more or less several times since. It may, however, be considered half hardy.

R. rugosa, Thunb. Japanese Rose.

In this species the flowers are large, of different shades of red and rose; are fragrant and thickly beset with sharp prickles. The branches are slender and well armed with prickles, and the foliage is wrinkled, shining and of great substance. The fruit is large and showy, and varies in colour from orange red to deep red. This rose has been tested in the North-west for about ten years and found to be generally hardy. Occasionally the tips of the branches are killed back more or less, but this is rare. There is also a variety with pure white flowers, which is very attractive, and another form producing red flowers which are loosely double; both these varieties are also hardy. A hybrid of *R. rugosa*, with white loosely-double flowers, known as Madame George Bruant, has survived the winter occasionally, but cannot be recommended as generally hardy.

Among the single varieties which have been tried and found tender are *Rosa cinnamomea*, *R. multiflora*, and *R. villosa pomifera*. These have all been killed back more or less during the winter, and sometimes killed to the ground. Many varieties of the hardiest sorts of Hybrid Perpetual roses have been tried. Some of them have been partly hardy for a time, but in the majority of instances they have died the first winter, and in no case have they survived more than two or three seasons.

RUBUS. RASPBERRY, BLACKBERRY, DEWBERRY.

In addition to the native wild raspberry, there are a number of cultivated varieties which succeed well in the North-west. All of the ornamental and cultivated forms of the blackberry and dewberry which have been tested have been found more or less tender.

SALIX. WILLOW.

Among the willows there are quite a number of species which are hardy in the North-west, and some of these makes handsome specimens. As a family, however, they do not present very much variety. All the willows may be readily propagated from cuttings.

Salix alba, L. White Willow. Europe.

This species has been tested both at Brandon and Indian Head and found quite hardy. The leaves are ashy-gray and somewhat silky, from 2 to 4 inches long, narrow and pointed. This tree is a rapid grower and serves a good purpose in a wind-break; it also makes a handsome round-headed specimen when grown in the open.

S. alba argentea is a variety of the White Willow with leaves of a more silvery character. This has not been quite so hardy as the ordinary form, several of the specimens under trial having suffered more or less from winter-killing.

S. daphnoides, Vill.—*S. acutifolia*, Willd. The pointed or Sharp-leaved Willow. Europe.

This willow has been tried extensively in the North-west and found entirely hardy. It has been used for hedges, wind-breaks, and also as single specimens, and has been very satisfactory. Grown in the open it soon makes a small tree from 10 to 15 feet high. The leaves are narrow and sharp-pointed, and the branches are covered with a whitish bloom.

S. fragilis, L. Brittle Willow. Europe, N. Asia.

This is a rapid grower and eventually makes a large tree. The leaves are large, lanceolate and pointed, with brown branches. This is a hardy variety, which has been tested in the North-west for the past eight or ten years, and has not been injured by winter.

A very attractive species with purplish-red twigs and long narrow leaves; a the North-west provinces, and is abundant along some parts of the Assiniboine and Saskatchewan rivers, occasionally forming dense thickets. It is very useful for holding the earth along the banks of streams, but its habit of suckering makes it undesirable for general planting. The leaves are very narrow, long and pointed.

S. Nicholsoni purpurascens.

A very attractive species with purplish, red twigs and long narrow leaves; a rapid grower and practically hardy.

S. pentandra, L. Laurel-leaved Willow. Europe.

The laurel-leaved willow is a very handsome and desirable species. When trained in tree form it develops a nice, rounded head. The leaves are of medium size, rather short and pointed, the upper side having a fine polished surface. This glossy appear-

ance of the leaves is quite characteristic. It makes an attractive hedge, but, being a rapid grower, needs frequent clipping.

S. rubra Forbyana. A red-barked willow from Europe. This also is a rapid grower and quite hardy.

S. viticella Britzensis. In this variety the twigs are distinctly red and the leaves long, narrow and pointed. It is a rapid grower and quite hardy. This makes a very handsome hedge. (See Plate III, fig. 4).

S. Voronesh. Voronesh Willow.

This willow was introduced from Russia by the late Prof. J. L. Budd, of Iowa, U. S., and has been disseminated under the name of Voronesh Willow. The bark of this species is a bright, deep yellow which makes it a striking object during the winter and early spring. Later in the summer the yellow colour becomes more subdued, although it is still distinctly yellow. The leaves are of medium size, narrow, long and pointed; it is a very rapid grower and soon develops in a good-sized tree. This is a very hardy sort.

Among the willows which have been tried and found more or less tender are the following:—

S. babylonica, L. Babylonian Willow, Europe.

S. babylonica annularis. Ringed Babylonian Willow.

S. Caprea, L. Goat Willow. Europe.

S. Caprea pendula. Kilmarnock Weeping Willow.

S. alba flava. Yellow White Willow.

S. nigra, Marsh. Black Willow. North America.

S. rosmarinifolia, L. Rosemary Willow. Europe.

S. Sieboldiana, Blume. Japan.

S. purpurea pendula.

S. repens argentea.

SAMBUCUS. ELDER.

Among the elders there are some desirable sorts which are useful in the North-west. The wood of all of them is more or less tender, and most of the varieties are killed to the ground each winter, but the roots are hardy and send up strong shoots in the spring which form shapely and desirable shrubs before midsummer.

Sambucus canadensis, L. American Elder. North America.

This is a shrub which attains a height of five to ten feet, with white pith occupying the greater part of the stem. The large, flat clusters of flowers are white and slightly fragrant, and the berries, which ripen in August, are black. In the North-west this shrub usually kills back, from slightly at the tips to half its length, and occasionally to near the ground.

S. nigra, L. Common European Elder. Europe.

In Europe this species forms a large shrub or small tree, but in this country, owing to more or less winter-killing annually, it is seldom more than four to five feet. The leaves are compound with smooth, deep green leaflets, the flowers cream-coloured, slightly fragrant, and the berries round and purplish-black.

There are several fine varieties of this species.

S. nigra aurea nova. Golden Elder.

This is a very desirable sort, with golden leaves, very ornamental. In the shrubbery border this forms a striking contrast with the green foliage of other shrubs. If the young shoots are regularly pinched off when they get the desired height, the golden colour of the leaves retains much of its brightness throughout the season.

S. nigra laciniata. Cut-leaved Elder.

A handsome form in which the leaves are finely cut into very narrow segments.

S. nigra pulverulenta alba.

In this variety the leaves are finely and thickly dotted with silvery white.

S. nigra fol. argenteis var.

A form in which the leaves are variegated with silvery markings. All these are desirable and ornamental sorts, notwithstanding that they kill to near the ground every winter, as they make rapid growth in the spring and are handsome shrubs by midsummer.

SHEPHERDIA.

Shepherdia argentea, Nutt. Buffalo Berry.

A hardy shrub or small tree native in the North-west, which is common in the Qu'Appelle, Saskatchewan and other river valleys. When full grown it sometimes reaches a height of 10 to 12 feet. The flowers are small and rather inconspicuous, the male and female flowers being borne on separate trees. The leaves are rather small, oblong, ovate, entire and covered with silvery scales. The fruit is a berry about the size of a red currant, of a scarlet colour, acid and edible. This is quite hardy in cultivation, and young plants put out a foot apart soon make a good hedge. Its thorny character also adds to its value for this purpose.

Shepherdia canadensis, (L.) Nutt. Canadian Shepherdia.

This is a lower-growing species, with somewhat larger ovate leaves, which are green and nearly smooth above; beneath they are silvery, more or less hairy, and dotted with rusty scales. In eastern Canada this shrub is found on the borders of lakes and rivers, and in Manitoba in some of the river valleys. The flowers are small and appear early in the season. The berries are sometimes red and sometimes yellow, sweetish and scarcely edible. This shrub is quite hardy, but is difficult to transplant successfully.

SPIRÆA.

The Spirææ are a very popular and useful class of ornamental shrubs, well adapted for the shrubbery border or for growing as single specimens on the lawn. The bushes are medium to low in size, and the flowers, which are small, white or pink, are very freely produced in showy clusters.

Spiræa arguta, Zabel. Of garden origin.

This is one of the best and earliest blooming sorts, and is quite hardy. It is also a free bloomer, and in the flowering season the bush is literally covered with feathery clusters of small, white flowers. It usually grows about three feet in height and is rather slender and somewhat pendulous in habit.

S. Billardii. Of garden origin, said to be a cross between *S. Douglasi* and *S. salicifolia*.

This forms a shrub from 4 to 5 feet high, with long, dense clusters of small, bright pink flowers. This variety is later in blooming than *Van Houttei*, and is a desirable sort. There is also a white variety known as *Billardii alba*. Both of these have been tested in the Canadian North-west and have generally proved hardy.

S. chamædryfolia, L. Germander-leaved Spiræa. Siberia to Dahuria.

This species endures the winter in the Canadian North-west some seasons, while in others the branches are killed half way back or more. It usually blooms quite freely; the flowers are white and grouped in hemispherical clusters, and are produced in June or July.

S. hypericifolia, L. Northern Hemisphere.

This species has wintered well at Brandon for several years, but has not yet been thoroughly tested at Indian Head. It is a vigorous, upright grower, producing numerous white flowers in umbels.

Spiræa trilobata, L.=*S. cratægifolia*. A native of Northern China and Siberia.

This is a bushy shrub about four feet high, with slender spreading branches and pure white flowers, which appear in clusters in May and June. It has proved fairly hardy both at Brandon and Indian Head.

S. japonica alba=*S. callosa alba*.

S. japonica rosea=*S. callosa rosea*.

S. japonica superba=*S. callosa superba*.

These are handsome forms of *Spiræa*, with white or rose-coloured flowers, which are natives of Japan and China. The bushes die to near the ground each year, but they start afresh from the roots and flower well later in the season.

S. salicifolia, L. White-flowered Meadow Sweet.

This species is found growing wild in many places in Manitoba, and is usually hardy in cultivation in most parts of the North-west. The flowers are produced in long, dense, terminal clusters. The leaves are narrow and pointed, resembling a willow, and the shrub is from three to four feet in height. There is also a rose-coloured variety. Both of these are hardy in cultivation.

S. sorbifolia, L. Sorbus-leaved Spiræa.

This is a very distinct form with long, compound leaves and large, compact, terminal clusters of small white flowers. It is an upright shrub from three to four feet high, a native of northern Asia. It is hardy both at Brandon and Indian Head.

S. Van Houttei, Zabel. Van Houtte's Spiræa.

Of garden origin, said to be a hybrid of *S. Cantoniensis* with *S. triloba*.

This is a vigorous growing spiræa, one of the most beautiful of the early blooming sorts, and quite hardy. It grows from four to six feet high, with dark green leaves and white flowers about one-third of an inch across. These are arranged in clusters which literally cover the bush during the blooming season, making it a most attractive object. (See plate II, fig. 1.) This variety has been many years under test both at Brandon and Indian Head and has proved fairly hardy.

The following have been tried and found tender:—

S. Bumalda, Burvenich. Anthony Waterer.

S. bracteata, Zabel.

S. Douglasii, Hook.

SYMPHORICARPOS. SNOWBERRY.

Symphoricarpos occidentalis, Hook. Wolfberry or Snowberry. Eastern North America.

This is a native shrub very common in many parts of the Canadian North-west from the eastern margin of the prairies to the Rocky Mountains. The flowers are pale rose-coloured and inconspicuous. The fruit is a white berry borne in clusters. It has been grown both at Brandon and Indian Head and found hardy. This shrub is compact in its growth and has been used at the Experimental Farm at Indian Head to form a low-growing hedge around the margins of the flower beds, and its neat habit has made it quite effective. (See Plate V, fig. 2.)

S. orbiculatus, Moench. Coral Berry.

This is also found native in the North-west country, and is very plentiful in the neighbourhood of Edmonton, Alberta.

In this species the flowers are small and reddish, and the fruit dark-red in imperfect clusters. It is very hardy.

SYRINGA. LILAC.

The Lilacs are universal favourites and are beautiful both in flower and foliage. The flowers are in large, showy panicles ranging from white through various shades of lilac, purple and red. In some varieties the flower clusters are produced so freely as to almost hide the foliage. There are several different species of lilac in cultivation, but the common lilac and its varieties are best known, and it is so hardy that it will succeed almost everywhere throughout the north and west. The fragrance of the flowers is sweet and rather heavy, if bunches of bloom are taken into the house; but in the freshness of the garden the odour is delightful.

Many of the varieties of lilac seed freely, and where seeding is permitted to excess, the shrub is much weakened and the bunches of bloom become fewer and smaller. To ensure vigorous growth the withered blossoms should be cut off after their beauty has faded, when the shrub will grow vigorously and produce, later in the season, strong, plump terminal buds from which fine clusters of bloom will issue the following spring.

Lilacs are easily raised from seed, but the seedlings vary much in the quantity and quality of their flowers. Some fine examples have been raised at the Brandon farm from seed of *Charles 10th*. (See plate I.) The best varieties are propagated by budding on the common stock or by striking cuttings. The latter method is preferable, as the shoots which come up from the roots of those budded on the common lilac produce inferior flowers and sometimes grow so strongly as to crowd and partially smother the branches grown from the bud, unless the undesirable shoots are promptly cut out; whereas if the shrub is on its own roots any shoots proceeding from it give flowers of uniformly good character. Lilacs are sometimes propagated by budding or grafting them on the privet, but this stock is objectionable on account of its tenderness and lack of vigour.

This useful group of ornamental shrubs contains several species and many splendid varieties which are quite hardy in the Canadian North-west. They are all very attractive when in bloom and the foliage is large and of deep, rich shades of green, which makes the bush an ornament throughout the summer. The leaves are very free from insect attacks.

Syringa vulgaris, L. The Common Lilac. This was introduced to cultivation in 1597, and hence the lilac has been an object of admiration among lovers of flowers for more than 300 years. It is a native of Persia and Hungary, and when planted in good soil grows to a height of 10 to 15 and sometimes 20 feet. The Common Lilac is too well known to need description. Among the earliest recorded varieties of this species is the single white form and a reddish sort known as *Syringa de Marley*. The first of the double sorts of the Common Lilac was introduced in 1870, and in recent years a large number of very handsome double and single forms have been produced. About thirty varieties have been tested at the Experimental Farms at Brandon and Indian Head, nearly all of which have been found quite hardy.

S. vulgaris Charles X. is one of the best of the single sorts. It is a remarkably free bloomer; its large clusters of rich reddish-purple flowers are produced in such abundance as to make it a very striking object. The flowers are highly fragrant.

Among other sorts with single flowers of great merit are:—

S. v. alba grandiflora, which produces very large trusses of charming white flowers.

S. v. Marie Legraye, a free bloomer with large clusters of white flowers; an excellent variety.

S. v. Congo, a very distinct single lilac of a deep shade of purplish blue. The flower clusters are of medium size, but so dark in colour as to be very striking.

Among the double forms of *Syringa vulgaris* the following are very desirable:—

S. v. Alphonse Lavallée. A very handsome form with beautiful bluish-violet flowers in large clusters.

S. v. Charles Joly. Flowers a dark wine red with a pale underside and set in large, long clusters. One of the finest of the double sorts.

S. v. Condorcet. In this variety the individual flowers are very large, semi-double, pale blue, and produced in long panicles.

S. v. Dr. Maillot. This is a handsome double form which produces large trusses of flowers of a delicate pinkish purple. (See Plate II, fig. 6.)

S. v. Emilie Lemoine. Flowers very large and globular, of a beautiful rosy lilac colour, a free producer of large clusters of fine bloom.

S. v. Jean Bart. This variety is of a deep lilac colour in bud; when open the double flowers have a fine shade of purple. The inner petals are somewhat twisted, which gives the flower cluster a very graceful habit.

S. v. Mons. Maxime Cornu. A very distinct variety, the flowers of which are almost pink and borne in large trusses.

S. v. Madame Abel Chatenay has pure white flowers, very double, freely produced in good-sized trusses.

S. v. Madame Casimir Perier is another double white, producing large clusters of handsome flowers.

The above are all very desirable forms of *Syringa vulgaris*. They all produce handsome, fragrant clusters of bloom and are quite hardy. Many others are well deserving of mention, as there are now over one hundred varieties catalogued by European nurserymen.

S. chinensis, Willd, known also as *S. rothomagensis*, or Rouen Lilac, is a very desirable sort and much appreciated. It is said to be a hybrid between *S. vulgaris* and *S. persica*. The leaves are smaller than the Common Lilac; the bush is of a graceful habit, and the flowers, which are of a purplish-violet colour, are produced in abundance in large clusters.

S. Josikæa Jacq. Josika's Lilac is a robust-growing species a native of Hungary. Its leaves are large and glossy, of a deep green colour above and paler below. The flowers, which appear from ten days to a fortnight later than the varieties of *Syringa vulgaris*, are of a bluish-purple colour. The clusters are smaller than those of the Common Lilac, and they have very little perfume. When well established, this variety blooms very freely, and on account of its lateness is seldom injured by spring frosts. It makes a beautiful hedge; its rigid habit and glossy, laurel-like leaves produce a fine effect. For hedge purposes young plants about 18 to 20 inches high should be chosen and planted in a single row 15 inches apart.

S. villosa, Vahl., a native of the northern parts of China, is of recent introduction. It is lower growing than the common lilac, ranging from four to eight feet. The leaves are of medium size and ovate in form, the flowers are of an attractive shade of pale bluish rose, with a waxy-looking surface and a pleasant fragrance, but not nearly so strong as *S. vulgaris*. This shrub is a charming addition to the lilac group, a free bloomer, with flower clusters of medium size. Its time of blooming is about two weeks later than the common lilac.

S. japonica, Decne. Japan Lilac.

The Japanese tree lilac was first brought from Japan in 1885. When full grown it forms a small tree from ten to fifteen feet high. The flowers are small, creamy white and are produced in large, dense clusters. They have a fragrance quite distinct from that of the ordinary lilac, reminding one of the hawthorn, or the privet. The

leaves are large and of a dark green colour. This is the latest of all the lilacs to bloom, the flowers appearing in Ottawa during the last week in June or the first in July.

With a judicious selection of the species and varieties referred to, one may have a succession of lilacs in bloom for from four to five weeks. All those referred to have been tested at Brandon and Indian Head and have proved hardy.

TAMARIX. TAMARISK.

Tamarix amurensis Hort. Amur Tamarisk.

This is a graceful shrub producing a feathery growth of branches which are covered in June with small, pale-pink flowers. It succeeds fairly well in Ottawa, but has proven too tender for the Canadian North-west.

TILIA. LINDEN.

Tilia americana, L. Basswood or American Linden. North America.

The basswood in eastern Canada is a widely distributed tree of handsome form and fine foliage. Young trees grown from seed ripened in the east have not been hardy either at Brandon or Indian Head. There are, however, some native basswood trees growing in Manitoba, in the Turtle Mountain district, and the neighbourhood of Carman, and in some other parts of the province, and trees grown from seed ripened in any part of Manitoba have proved quite hardy at Brandon and fairly hardy at Indian Head.

Tilia vulgaris, Heyne. European Linden.

The European Linden has also been tried at both the Western Experimental Farms, but it has usually been killed to the ground or killed outright the first winter. Several specimens, however, have survived in sheltered locations and at Indian Head there are now three specimens eight or nine years planted which seem to be quite hardy.

ULMUS. ELM.

Ulmus americana, L. American Elm.

The American elm is one of the best and most durable of trees for ornamental or shade purposes. As a street tree or for avenues it is unsurpassed; its beauty of form, durability and freedom from disease place it in advance of most other trees for such purposes. In the Northwestern provinces it is as yet very free from insect pests. The American elm delights in low, moist and rich soils, and is found in all parts of Eastern Canada. It occurs native also in many of the river valleys in Manitoba. Macoun says, 'it is found in the valley of the Red River from Pembina to Lake Winnipeg. It ascends the Assiniboine to its source. It passes by the way of Lakes Manitoba and Winnipegosis to Red Deer River which flows into the last named lake, where it ceases to grow in latitude 53°. On the Saskatchewan it ascends to near Cumberland House in latitude 54°.'

Trees grown from seed produced in the east are more or less tender and unsatisfactory, while those grown from seed ripened in the North-west provinces are quite hardy. Young seedlings may usually be found in abundance growing under or near by mature elms in river valleys in the North-west, and if dug up and transplanted into good soil will grow rapidly, and soon develop into vigorous and shapely trees. (See Plate IV, fig. 4.)

U. racemosa, D. Thomas. Cork or Rock Elm. North America.

This tree is common in some parts of eastern Canada, but has not been found native in the North-west. A large number of young trees of this species were planted in 1889 both at Brandon and Indian Head. Those planted at Brandon all died within



1. Rocky Mountain Blue Spruce, Indian Head. 2. Riga Pine, Indian Head. 3. European Larch (*Larix Europaea*). 4. Black Spruce (*Picea nigra*).
11725—p. 40.

a year or two, while a few of those planted at Indian Head in a small nursery where they had much shelter, survived, and several of them are still living. These have now attained a fair size and seem quite hardy. As soon as these trees bear seed it is probable that a hardy race of Rock Elm can be produced.

VIBURNUM. ARROWWOOD.

The Viburnums deserve a place among our most esteemed ornamental shrubs. They are decorative when adorned with their clusters of white flowers, also when in fruit. The foliage is handsome and assumes warm tints of colour in the autumn. Several of the species are hardy in the Canadian North-west. They can all be raised from seed, but this is slow to germinate. It seldom grows until the second year, and instances are known where germination has been delayed until the fourth and even the fifth year after sowing.

Viburnum Lentago, L. Sheepberry, Nannyberry.

This species is found in many parts of eastern Canada, and also in the North-west in the valleys of the Red, Assiniboine and Saskatchewan rivers. It varies in height from 6 or 8 to 15 feet or more. The leaves are ovate, pointed, from 2 to 4 inches long, and the flowers are in flat clusters, varying from 2 to 5 inches across. The fruit is oval and of a bluish-black colour. This is a handsome shrub, which is quite hardy in most parts of the North-west.

V. Opulus, L. High-bush Cranberry.

This species is found in the east as far as Anticosti Island ; it is also a native of the North-west, and is very generally distributed throughout the northern parts of Canada. The High-bush Cranberry attains a height of from 6 to 10 feet or more and makes a handsome ornamental shrub, which is interesting when in flower and very decorative when adorned with its bright scarlet fruit. The berries grown on the eastern form of this shrub are very bitter, while those grown in the North-west are pleasantly acid, with very little bitterness, and are used by the settlers for the making of pies, preserves, &c. This difference in the fruit is so marked as to lead one to suspect that they may belong to different species.

V. Opulus sterile. Snow-ball or Guelder Rose.

This is a well-known form of *Viburnum Opulus*, which has been long in cultivation, in which the fertile flowers are nearly all changed to sterile, showy ones. When this shrub is in full bloom, the flowers, which are a snowy white, form numerous large globular heads, which are very attractive. On this sterile variety it is seldom that any fruit is formed, and it is propagated from suckers, layers or cuttings.

This variety is nearly hardy at Brandon and Indian Head ; occasionally the tips of the branches are injured by winter, and if the season is very severe they may be killed from one foot to half way to the ground.

Viburnum Lantana, L. Wayfaring Tree.

This is an upright and handsome shrub, with medium-sized, strongly-veined, bright green leaves, producing flowers nearly white, in terminal flat clusters, which are succeeded by bright red berries, which gradually change until they become nearly black. This is a native of Europe, which has been tested at Brandon and Indian Head for the past thirteen years. At Brandon it is seldom injured by winter, and generally blooms well ; sometimes, however, the blossom buds are injured. At Indian Head many of the shoots are killed back, but some usually escape injury, so that the bush flowers fairly well. Although not entirely hardy, it is so nearly hardy as to be well worth growing.

V. dentatum, L. Arrowwood.

This is found native in different parts of Canada from New Brunswick to Ontario, also in the United States as far west as Minnesota. It is a handsome shrub (See Plate II, fig. 3) of upright and compact growth, with coarsely toothed leaves and flat clusters of white flowers from two to three inches across. The fruit is in small clusters, nearly round and of a bluish-black colour. Although not yet thoroughly tested, it is probable that this shrub will prove hardy in the Canadian North-west.

Other varieties of *Viburnum* are being tested, and it is probable that additional hardy species will be found.

VITIS. GRAPE.

Vitis vulpina, L. River Bank or Frost Grape.

A vigorous, tall growing, climbing vine found on river banks and in low thickets which produces sweet scented clusters of flowers, and later small, compact bunches of round, purplish-black grapes, covered with a blue bloom. The fruit is acid and, if picked before frost, is austere and unpleasant, but after frost it becomes much sweeter and quite palatable.

This species is common in eastern Canada, and is found also in the valleys of the Red, Assiniboine and other rivers, especially in the southern parts of Manitoba. Plants raised from seed are frequently sterile, producing staminate flowers only. In such cases, the flower clusters are unusually large and abundant. To secure fruiting vines young plants should be raised from cuttings taken from vines known to be fruit-bearing. Hardy both at Brandon and Indian Head.

CONIFERÆ.

ABIES. FIR. SPRUCE.

Abies balsamea, L. Mill. Balsam Fir.

This evergreen has a wide native range, is very abundant in Ontario and Quebec and in eastern Canada generally; it is also found native in the North-west country. It occurs in the Lake of the Woods district and the valley of the Saskatchewan. Macoun says, 'it occurs around James Bay, and has been found on the Athabaska River in latitude 58°.'

The balsam fir has been tested at the Experimental Farms at Brandon and Indian Head for the past ten years. Young trees brought from the east have not been entirely hardy, but when obtained from the neighbourhood of Rat Portage, they have proven quite hardy. They are, however, of slow growth.

The variegated form of this tree, *Abies balsamea variegata*, obtained from Europe, has also been tried and found fairly hardy.

JUNIPERUS. JUNIPER.

Among the junipers there are not many species hardy enough to endure the winters of the Canadian North-west.

J. horizontalis, Moench. Creeping Savin.

This grows abundantly in some parts of the North-west provinces, preferring sandy and rocky places where the soil is poor and barren, sometimes covering acres of ground with a carpet of green. It grows about six inches and upwards in height. Several attempts have been made at the experimental farms to transplant this creeping form of savin, but without success. Probably the soil in which it has been planted has been too rich. If it could be successfully transplanted there is no doubt about its hardiness. Macoun gives the distribution of this species as from Anticosti Island to the summit of the Rocky Mountain passes.

Juniperus Sabina, L. Common Savin.

This handsome evergreen, native in the mountains of Europe, has been tested for the past thirteen years, both at Brandon and Indian Head and found hardy. It has a low-growing, spreading habit, rarely attaining a height of more than three feet. When well rooted it grows rapidly, and its rich deep shade of green makes it a desirable object on a lawn. It succeeds well also under partial shade.

J. Sabina variegata is a variegated form of the Common Savin, and *J. Sabina* var. *erecta* an upright growing variety of the same, both of which have been tested in the Canadian North-west and found hardy.

J. virginiana, L. Red Cedar, Virginian Juniper.

This well known ornamental tree is found growing on dry, rocky and somewhat sterile soils in different parts of Eastern Canada. It varies in size from a shrub to a small tree and under favourable conditions develops into a good-sized tree of 50 feet or more in height. It is found in abundance in many parts of Ontario, from Ottawa to the shores of Lake Erie, and as far north as Parry Sound. The red cedar has been repeatedly tried at Brandon and Indian Head during the past eighteen years, and while a large proportion of the specimens planted have died, a few have survived at each farm, gaining apparently in hardiness from year to year, and for the past few years seem to have become quite hardy.

J. virginiana elegans is a handsome variety of this tree, which has been tried for several years at the North-west farms, and has shown a fair degree of hardiness. As yet, however, the specimens are small and usually have the advantage of being covered by snow during the coldest winter weather. Among the other varieties of Juniper which have been tried and found more or less tender are:—

J. communis, L. Common Juniper,

J. communis fastigiata. Irish Juniper

J. virginiana pyramidalis=*J. fragrans*.

J. virginiana Schottii.

PICEA. SPRUCE.

Among the Spruces are found some of the most valuable evergreen trees for the North-west plains.

Picea canadensis (Mill.) BSP. White Spruce.

This is a very handsome evergreen tree which, when grown in open places, assumes a compact pyramidal form, branching almost to the ground. It is found in all parts of eastern Canada, from Gaspé to north of Lake Superior. In Manitoba it is very common on the sand hills which margin the first prairie steppe. Macoun says: 'Occasional trees are met with in the Saskatchewan valley and in the Cypress Hills.' It has also been found on the Athabasca River in latitude 54°.

When trees of this species are grown from seed produced in eastern Canada and sent to the Northwestern provinces, they are usually tender, and if planted in exposed situations a large proportion of them die the first winter. If, however, they are brought from the sand hills on the first prairie steppe in the neighbourhood of Sewell and north and south of that point where young trees can be found in great abundance, they are perfectly hardy. Many hundreds of these trees have been planted at the Experimental Farms at Brandon and Indian Head, and no injury from winter has ever occurred to them. At Brandon one of the finest hedges on the farm is white spruce, (See Plate III, fig. 2). This is one of the most valuable trees for planting in the North-west, provided the specimens set out are native. In transplanting these or any other evergreen trees great care should be taken to keep the roots moist during the time they are out of the ground. If the root fibres are permitted to dry, the young trees will be very much injured. To prevent this the roots should be well wet as often as is necessary and covered with wet moss or wet sacking during the time of removal.

With the exercise of due care, the white spruce, provided the trees are small, may always be transplanted successfully. Well grown bushy specimens, from 1½ to 2 feet high, are quite large enough. Attempts to transplant trees from 4 to 6 feet high are almost always a partial if not an entire failure.

Picea mariana (Mill.) BSP. Black Spruce.

This is said to have a wider range than the White Spruce, and to extend from northern Labrador to Lake Athabasca (lat. 59°). It is very much like the White Spruce in appearance, and the two species are frequently confounded. They may, however, be distinguished by the length of the cones, which are shorter in the Black Spruce, seldom an inch long, while in the White Spruce they are longer, and never under an inch in length. The needle-like leaves of the Black Spruce are also usually shorter than those of the white variety. The Black Spruce is said to form the great bulk of the spruce trees which furnish the large stretches of timber found in many of the northern parts of Manitoba, west of Lake Winnipeg, and in the northern parts of the provinces of Saskatchewan and Alberta.

The Black Spruce also makes a very handsome tree, (See Plate VI, fig. 4,) and is quite hardy if grown from seed ripened in the North-west. Many young trees have been brought from the vicinity of Rat Portage to both the North-west Experimental Farms, and have succeeded well.

P. Engelmanni, Engelm. Englemann's Spruce.

This species grows in abundance in the Rocky and Selkirk Mountains, where it attains a height of 100 to 150 feet, with the trunk sometimes four feet in diameter. Three young trees were brought from Glacier in 1895 and planted at Indian Head, where they have proven hardy.

Picea Abies (L.) Karst. Norway Spruce.

This handsome and well known evergreen is a native of the mountains of Northern Europe, and has repeatedly been tested at Brandon and Indian Head during the past twenty years. A large proportion of the trees planted have died, but a few have manifested unusual individual hardiness and have survived. The survivors have gradually become acclimatized and now appear to be quite hardy. They have grown to be handsome specimens, and good examples of this species may now be found at both of the North-western Experimental Farms. As some of these trees have begun to bear cones, seed will shortly be obtainable from them for sowing, and trees grown from such seed will probably be quite hardy from the start.

Picea pungens, Engelm. Rocky Mountain Blue Spruce.

This is probably the most attractive evergreen of recent introduction. It is found at high elevations in Colorado where it is seen of various tints of colour from a plain green, through different shades of steely blue, some slightly blue, while others are of a deep, bright, steely or grayish shade of a very attractive character. This blue colour in the best of specimens almost disappears in winter, but with the first warm days of spring the lower branches of the tree begin to brighten, and a deep bluish tint gradually creeps upward until it pervades the whole tree. By this time the buds begin to burst and the new growth pushes out of a much brighter shade, and this bright colour is maintained until the autumn when it changes gradually to a deep green. The tree has a compact pyramidal habit with the branches produced each year extending almost horizontally, showing more or less distinctly the separate layers of annual growth, giving the tree a storied appearance. The leaves are longer and much stiffer than in most of the other species of spruce. The blue colour of the foliage is produced by a waxy secretion on the needle-like leaves, a sort of bloom which when rubbed is easily removed. The varying shades of colour in different trees result from the relative density and brightness of this bluish bloom. Nurserymen engaged in propagating this spruce usually select seed from the bluest specimens, when a considerable proportion of the seedlings usually show the blue colour more or

less strongly. The seedlings, however, vary much in this respect. In Europe this tree is propagated by grafting twigs from some of the bluest trees on young Norway or white spruce, when the young trees so grown are all uniformly blue. In Europe these grafted trees of *Picea pungens* are usually sold under the name of *P. Parryana glauca*, and *P. pungens Kosteriana*.

The Rocky Mountain Blue Spruce has been under test both at Brandon and Indian Head since 1896, and has proven quite hardy (See Plate VI, fig. 1 from photo of specimens at Indian Head). For several years the specimens planted made slow growth, and occasionally showed slight injury from winter, but since they have become well established their growth has been satisfactory, and for the past twelve years they have shown no indication of injury from winter.

PINUS. PINE.

There are not many of the pines which furnish satisfactory material for planting on the North-west plains. Since they have but few fibrous roots, they are difficult to transplant, and efforts to grow pines are sometimes unsuccessful for this reason rather than from lack of hardiness.

P. Banksiana, Lamb. Labrador Pine, Banksian Pine, Jack Pine.

This is a northern species with a very wide distribution. R. Macoun says it extends from Halifax, Nova Scotia, north-westerly to the Athabaska River and northerly down the Mackenzie River to the Arctic circle. When grown without being crowded, this is rather a pretty tree. The leaves are in clusters of two, are rather short, seldom over an inch long, more or less curved and of a light green colour. It is difficult to transplant, and the efforts made to move young trees from the districts about Rat Portage, Prince Albert and Edmonton to the North-west Experimental Farms have not always been successful. There is, however, no lack of hardiness in this variety, and if transplanted very young, when only eight or ten inches high, this tree can usually be moved successfully. This is a slow-growing species.

P. Cembra, L. Stone Pine. From Mountains of Central Europe and Siberia.

This tree makes a close, erect symmetrical growth. The leaves are $2\frac{1}{2}$ to 3 inches long in clusters of five. They are slender, flexible, and somewhat triangular, one side a smooth green, the other two with silvery white lines. It is a very slow-growing tree, and requires many years before a specimen reaches any considerable size. The Stone Pine has been under test since 1896, both at Brandon and Indian Head, and has proved quite hardy.

P. sylvestris, L. Scotch Pine. Northern Europe.

This well known evergreen has a symmetrical, upright habit of growth, and when allowed sufficient space for development makes a very shapely tree. The leaves are arranged in clusters of two, are from $2\frac{1}{2}$ to 3 inches long—shorter in old trees—somewhat flattened and twisted, and of a dull, bluish-green colour.

Several hundred young specimens of the Scotch pine were planted at each of the North-west Experimental Farms in 1889 and 1890. At that time there was very little shelter to protect them, and a large proportion died during the winters of 1890 and 1891. A few, however, survived, either from individual hardiness or more favourable surroundings as to shelter, and maintained a somewhat stunted growth for several years, during which time they became established, and have since made satisfactory progress. For the past twelve or fourteen years they have been quite hardy.

P. sylvestris rigensis. Riga Pine.

This is said to be a somewhat hardier form of the Scotch pine grown from seed obtained in forests near Riga, Russia. A number of young trees of this variety have also been tried both at Brandon and Indian Head. These were put out in 1890, and subsequent years, and some of the trees have survived. The Riga pine has a more

upright habit of growth than the ordinary Scotch pine, otherwise they seem to be identical. (See Plate VI, fig. 2.)

In planting young Scotch or Riga pines in the North-west, small, well-rooted specimens should be chosen, and they should be put, where possible, in the shelter of some protecting trees. This tree, however, is a very hardy one, and would probably endure the winter even in a moderately open place if some slight protection were afforded. If a stake were driven down near the tree and a wisp of straw wound around to protect the foliage this would no doubt help to carry it safely through the winter.

P. montana, Mill. Mountain Pine. From Mountains of Central Europe.

This is a large, rather compact, bush-like form of pine, from 5 to 15 feet in height, very suitable for planting where space is limited. The leaves are in pairs about two inches long, somewhat twisted, and of a dark green colour.

A considerable number of young specimens of the Mountain Pine were planted at Brandon and Indian Head in 1890 and 1894, a large part of which died. A few survived, which have gradually acquired greater hardiness, and those which are now growing in shelter appear to be quite hardy.

In planting the Mountain Pine in the North-west, small, well-rooted specimens should be chosen, and they should be so placed as to have the shelter of other established trees.

P. montana *Mughus*. Dwarf Mountain Pine.

This is a low-growing and compact form of the Mountain Pine, which makes a neat and attractive specimen. In hardiness this is similar to the ordinary larger form. The Mountain Pine appears to be somewhat less hardy than the Scotch Pine.

Pinus ponderosa, Dougl. Heavy wooded Pine, Bull Pine. From the drier districts in British Columbia.

This is a handsome species of pine, which is the principal tree occurring in the central and southern dry regions in British Columbia. When mature, it is a large tree with widely spreading branches and light red, scaly bark. The leaves are in clusters of three, rather stout and very long, measuring from 5 to 6 inches.

This species has been tested during the past fifteen years, both at Brandon and Indian Head. A very large proportion of the trees planted have been winter-killed, and most of the survivors suffered badly during the severe winter of 1900. Specimens have, however, survived at each of the North-western farms, but the growth has been stunted. Some of the best of the surviving specimens at Indian Head, growing in a sheltered spot with some Scotch Pine, were unfortunately destroyed recently by a fire which occurred in some dry grass in the neighbourhood, and which spread over this small plantation before it could be extinguished.

This species may be regarded as tender in the North-west especially in severe winters, unless afforded exceptional conditions as to shelter. It is quite hardy at Ottawa.

Pinus Strobus, L. White Pine.

This species has been several times tested at both the North-west farms, but has been found too tender to endure the climate. Most of the specimens planted have died the first winter. The only young trees thus far obtainable have been grown from eastern seed. In Macoun's catalogue this species is said to occur between Lake Superior and Winnipeg River around Lonely Lake; also near Lake Winnipeg. If young trees from these northern localities could be obtained they would in all probability prove hardy.

P. resinosa Ait. Red Pine.

This beautiful pine is common in eastern Canada, and is known to extend west of the Lake of the Woods. It has been found difficult to procure young trees of this species from northern sources, hence tests were not begun with Red Pine until 1902. The results obtained thus far are promising as to hardiness, but not yet conclusive.

In addition the following have been tried and found too tender to endure the North-west climate:—

- Pinus Laricio austriaca*. Austrian Pine.
Pinus contorta murrayana. Lodge Pole Pine.
Tsuga canadensis, (L.) Car. Hemlock.
Pseudotsuga Douglasii, Car. Douglas' Spruce.

THUJA. ARBOR VITÆ.

Thuja occidentalis, L. Arbor-vitæ, White Cedar.

This is a well-known and widely distributed tree in Quebec, Ontario and New Brunswick, and extends northwards to the eastern extremity of Lake Winnipeg in Manitoba. Many specimens have been planted in the city parks at Winnipeg, which have been brought in by settlers within a few miles of the city. This tree is of a conical form with a dense frond-like foliage of a bright green colour in the summer, but which assumes a dull green hue during the winter months.

A large number of young trees of Arbor-vitæ were planted on the Experimental Farms at Brandon and Indian Head in 1889, but most of these, being without shelter, died during the winters of 1890 and 1891. Many additional specimens were planted in subsequent years, after some shelter had been provided, and some of these have now stood the winters for ten or twelve years, and appear to be quite hardy. The experience gained indicates that young Arbor-vitæ trees brought from the east are not usually hardy in the North-west in exposed situations, but that they are fairly hardy when planted in sheltered spots. There is little doubt that young native Arbor-vitæ trees from near Winnipeg would be much harder than those brought from the east.

There are many very distinct varietal forms of the Arbor-vitæ, which have also been tested at the Brandon and Indian Head farms, and the following, when planted in sheltered situations, appear to be about equally hardy with the common Arbor-vitæ.

T. occidentalis Elwangeriana. Elwanger's Arbor-vitæ. A variety with distinctly finer foliage and semi-dwarf habit.

T. occidentalis Hoveyi. Hovey's Arbor-vitæ. A compact form with the foliage in large flat plates which open and close gracefully with the wind.

T. occidentalis variegata. Variegated Arbor-vitæ. A variety resembling the ordinary form with the tips of the foliage white.

T. occidentalis columbia. Columbian Arbor-vitæ. A semi-dwarf form in which the silvery tipping is deeper and more constant than in *variegata*.

T. occidentalis Wareana. Ware's Arbor Vitæ. A semi-dwarf variety, forming a dense, nearly oval mass of foliage from six to eight feet high, very regular in outline and coarser in foliage than the ordinary type.

T. occidentalis aurea (Douglas), Douglas' Golden. A semi-dwarf form, widely tipped and splashed with golden shades.

T. occidentalis lutea. A dwarf form with the larger part of the foliage of a golden hue.

The following varieties have also been tested and appear to be more tender —

T. occidentalis pyramidalis. Pyramidal Arbor-vitæ. A form of the tree which assumes the character of a dense elongated pyramid with a narrow base.

T. occidentalis Mecani. Meehan's Arbor-vitæ. A golden tinted semi-dwarf form where the golden hue extends down the foliage in a broken character for three or four inches from the tips.

There are several other forms of a dwarf character, such as *T. o. compacta* and *T. o. globosa*, which have been tested, and which seem to be about as hardy as the common form.

LARIX. LARCH. TAMARACK.

The larches, although they shed their leaves during the winter, are true conifers, and are entitled to consideration here.

Larix laricina (Du Roi), Koch. American Larch, Tamarack, Hackmatack.

This tree has a very wide distribution. 'With the black spruce it occupies the larger part of the swampy ground from Newfoundland, Labrador and the eastern provinces to the eastern base of the Rocky Mountains in the Peace River region, latitude 56°' (Macoun). The American larch is of medium height, of rather slender growth, sometimes pendulous in habit, usually found in swampy woods or on the margin of lakes. The leaves, which appear early in the spring, are narrowly linear in form and arranged in fascicles or clusters, soft and of a bright green colour; the cones are small, from $\frac{1}{2}$ -inch to $\frac{3}{4}$ -inch in length.

A number of young trees of this species have been procured from the neighbourhood of Rat Portage, also from among the sand hills at Sewell, Man., on the first prairie steppe. These have grown well and have proven quite hardy at Brandon and Indian Head.

L. decidua Mill. European Larch.

This is a tall, handsome pyramidal tree of rapid growth and robust habit, found native in the European Alps. The leaves are linear, soft and arranged in fascicles as in the American Larch, but usually average a little longer, and are of a deeper shade of green. The cones are about twice the length of those of the American Larch, measuring from 1 to $1\frac{1}{4}$ inches in length; the branches are usually more or less pendulous. The regularity and beauty of its outline during every stage of its growth makes this tree a favourite object for decorative purposes. (See Plate VI., fig. 3.) Unfortunately it cannot be said to be hardy in the North-west. Out of several hundred young trees planted at the North-west farms at different times during the past 18 years, only a very few specimens have survived. These, however, seem to have become quite hardy and are growing well. As soon as seed can be obtained from these acclimatized trees it is probable that a hardier race can be produced.

There is another species of larch known as the Mountain Larch (*Larix Lyalli*), which may probably prove hardy in cultivation in the North-west. This tree is found in the Rocky Mountains at an altitude of from 6,000 to 7,000 feet, but no opportunity has yet occurred for making a satisfactory test of this species.

GINKGO.

Ginkgo biloba, L. Maiden Hair Tree.

Several specimens of this interesting tree have been tried at each of the western farms, but in no case have they survived a winter.

